

# Service Manual

## and Technical Guide

PERSONAL FACSIMILE

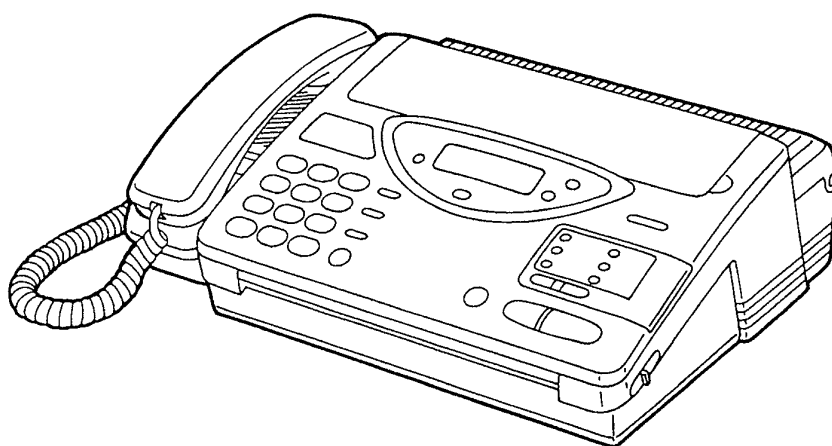
# KX-F2200E-G

Grey Version

# KX-F2200E-W

White Version

(for United Kingdom)



### WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

# Panasonic

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When you mention the serial number, write down the 11 digits. The serial number may be found on the label affixed to the bottom of the unit.

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## NOTE

### SAFETY CAUTIONS FOR LITHIUM BATTERY

(FOR UNITED KINGDOM)

THE LITHIUM BATTERY IS A CRITICAL COMPONENT

|             |        |        |                 |            |
|-------------|--------|--------|-----------------|------------|
| TYPE NUMBER | CR2032 | (BATT) | MANUFACTURED BY | MATSUSHITA |
|             | CR2032 | (BATT) |                 | SONY       |

IT MUST NEVER BE SUBJECTED TO EXCESSIVE HEAT OR DISCHARGE. IT MUST THEREFORE ONLY BE FITTED IN EQUIPMENT DESIGNED SPECIFICALLY FOR ITS USE.

REPLACEMENT BATTERIES MUST BE OF AN APPROVED TYPE AND MANUFACTURER AS INDICATED ABOVE. THEY MUST BE FITTED IN THE SAME MANNER AND LOCATION AS THE ORIGINAL BATTERY, WITH THE CORRECT POLARITY CONNECTIONS OBSERVED.

DO NOT ATTEMPT TO RE-CHARGE THE OLD BATTERY OR RE-USE IT FOR ANY OTHER PURPOSE. IT SHOULD BE DISPOSED OF IN WASTE PRODUCTS DESTINED FOR BURIAL RATHER THAN INCINERATION.

#### WARNING

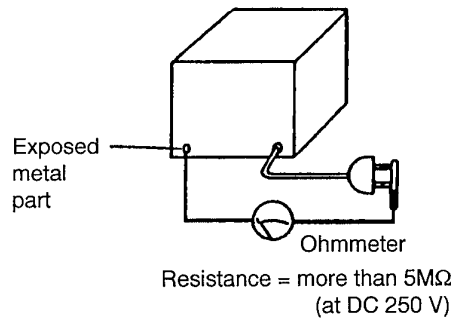
THE LITHIUM BATTERY IN THIS EQUIPMENT MUST ONLY BE REPLACED BY QUALIFIED PERSONNEL. WHEN NECESSARY, CONTACT YOUR LOCAL PANASONIC SUPPLIER.

## SAFETY PRECAUTIONS

1. Before servicing, unplug the power cord to prevent an electric shock.
2. When replacing parts, use only the manufacturer's recommended components.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to perform the following insulation resistance test to prevent the customer from being exposed to shock hazards.

## INSULATION RESISTANCE TEST

1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with an ohmmeter between the jumpered AC plug and each exposed metal cabinet part (screwheads, control shafts, handle brackets, etc.).  
 "Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.
4. If the measurement is outside the specified limits, there is a possibility of a shock hazard.  
 The equipment should be repaired and rechecked before it is returned to the customer.



## FOR SERVICE TECHNICIANS

**ICs and LSIs are vulnerable to static electricity.**

**When repairing, the following precautions will help prevent recurring malfunctions.**

- 1) Cover the plastic parts boxes with aluminum foil.
- 2) Ground the soldering irons.
- 3) Use a conductive mat on the worktable.
- 4) Do not touch IC or LSI pins with bare fingers.

## SPECIFICATIONS

### 1. Integrated Telephone System (ITS) Section

|           |   |
|-----------|---|
| Type:     | D type handset, Single ITS                        |
|           | Push button type 12 key dial pad                  |
| Function: | Speaker Phone (Electric Volume type, 8-level)     |
|           | 10 stations one-touch dialer (30 digits)          |
|           | Auto redial                                       |
|           | Electronic telephone directory                    |
|           | Combination dialing                               |
|           | 22 speed dialer                                   |
|           | Ringer control [3-steps (H, L, Off) control type] |
|           | Pulse dialing or DTMF (Tone) Dialing              |
|           | Mercury compatible                                |

### 2. Telephone Answering Machine (TAM) Interface Section

|           |                                      |
|-----------|--------------------------------------|
| Type:     | External TAM or Telephone jack       |
| Function: | Automatic EXT. TAM/FAX selection     |
|           | TEL, FAX, TEL/FAX, EXT. TAM selector |

### 3. Facsimile Section

|                           |   |
|---------------------------|---|
| Type:                     | Desk top.   |
| Applicable Lines:         | Public switched telephone network   |
| Compatibility:            | ITU-T G3  |
| Document Size:            | MAX, 216 mm (8 1/2") in width, MAX. 600 mm (23 5/8") in length                                |
| Effective Scanning Width: | MAX, 208 mm (8 3/16")   |
| Printing Paper Size:      | 210 mm (letter)×30 m roll (8 1/4"×98 ft roll), 210 mm (letter)×50 m roll (8 1/4"×164 ft roll) |
| Effective Printing Width: | 208 mm (8 3/16")  |
| Transmission Time*:       | Approx. 30 sec/page (G3 Normal mode)  |
|                           | Approx. 15 sec/page (Original mode)   |
| Scanning Density:         | Horizontal 8 pels/mm (203 pels/inch)  |
|                           | Vertical 3.85 lines/mm (98 line/inch)-Standard  |
|                           | 7.7 lines/mm (98 line/inch)-Fine  |
|                           | 15.4 lines/mm (392 line/inch)-Superfine   |
| Image Sensor Type:        | CCD image sensor  |
| Printer Type:             | Thermal printer   |
| Data Compression System:  | Modified Huffman (MH), Modified Read (MR)   |
| Modem Speed:              | 9600/7200/4800/2400 bps; Automatic fallback   |
| Function:                 | 10 station automatic transmission, Delayed Transmission                                       |
|                           | Automatic document feeder (Max. 15 page), Polling, Polled                                     |
|                           | Copy function, Silentfax Receiving,   |
|                           | Remote Fax Receiving, Paper Cutter, Junk Mail Prohibitor                                      |
|                           | Paper curl reduction, HELP function   |

### 4. General

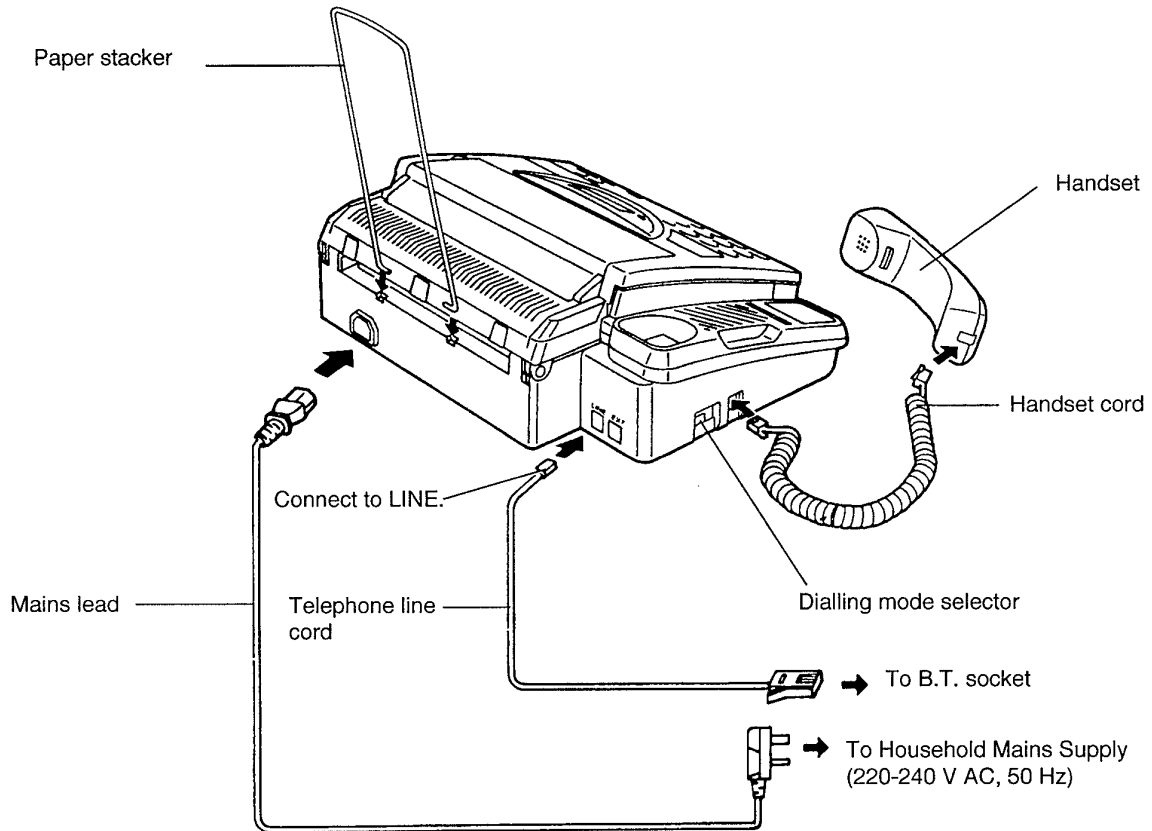
|                    |  |
|--------------------|--|
| Power Supply:      | AC 220-240V, 50Hz  |
| Power Consumption: | 1 Battery 3 V (Lithium Battery)···For Memory Backup and Real Time Clock Backup |
|                    | Transmission: Approx. 15 W   |
|                    | Reception: Approx. 35 W  |
|                    | Copy: Approx. 40 W   |
|                    | Standby: Approx. 5 W   |
|                    | Maximum: Approx. 100 W   |
| LCD:               | 15×1 line  |
| Speaker:           | 5 cm (1 31/32") PM dynamic   |
| Microphone:        | Condensor microphone (for SP-Phone)  |
| Dimensions (H×W×D) | 122×362×287 mm (4 13/16"×14 1/4"×11 5/16")                                     |
| Weight:            | 3.9 kg (8.6 lb.)   |

\*Transmission Time: Transmission time applies to text data using ITU-T No. 1 test chart, between same machine models at maximum modem speed.

Transmission time varies in actual usage.

Design and specifications are subject to change without notice.

## CONNECTION

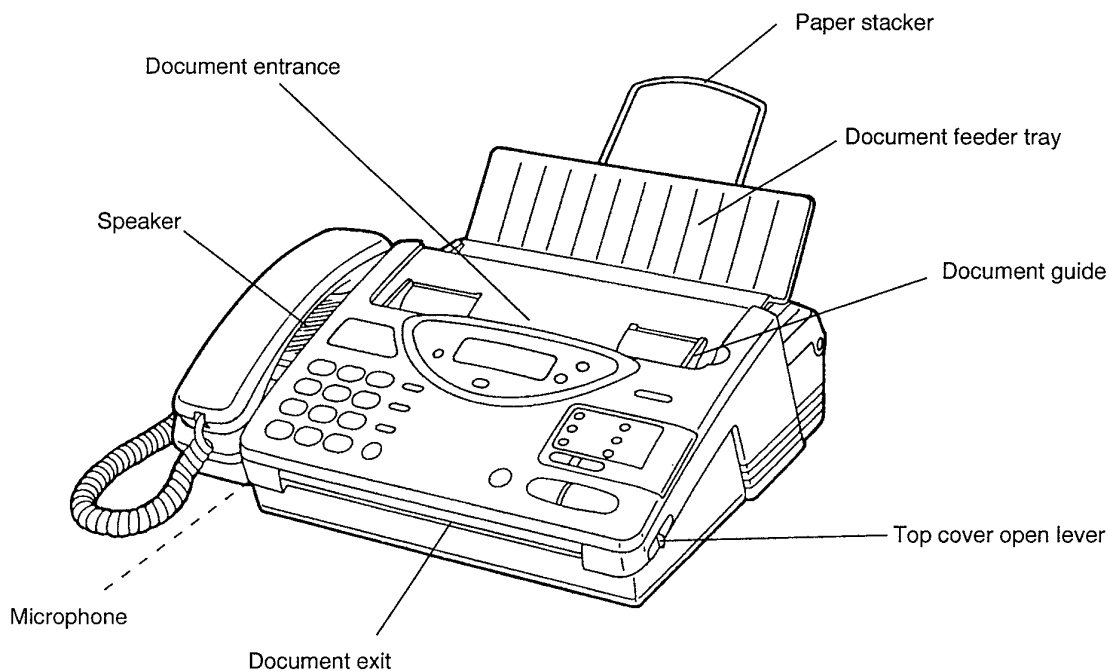


**Note:**

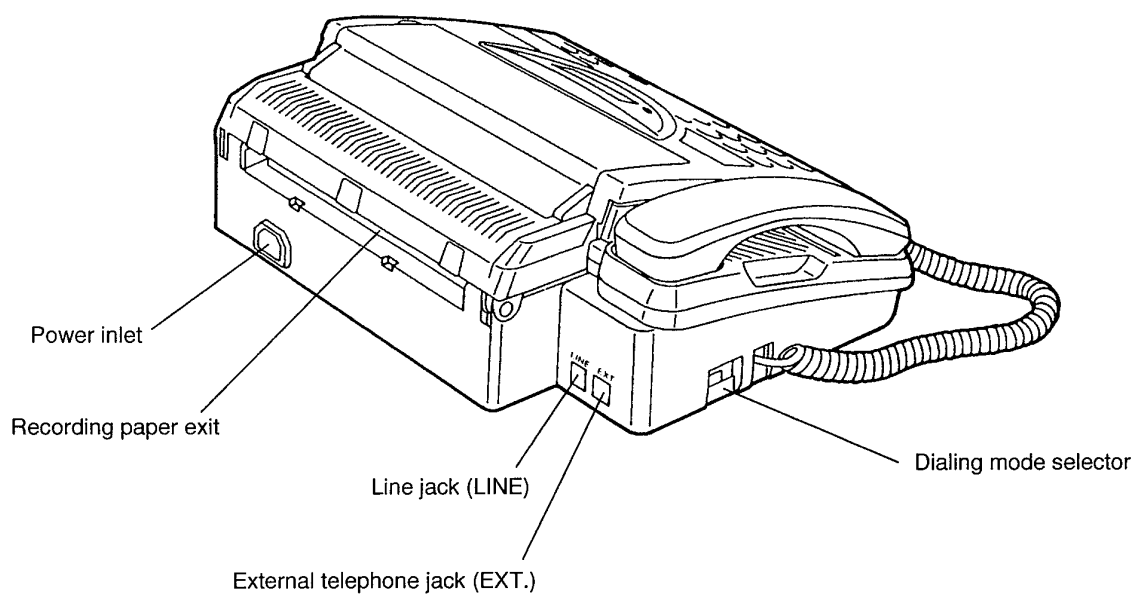
- When a mains power failure takes place, you are only able to use the unit as a standard telephone.
- When you operate this product, the socket outlet should be near the product and be easily accessible.
- Telephone line connections and handset connection are at TNV (Telecommunication Network Voltage).
- You can connect an external telephone/answering machine to the unit after peeling off the tape on the external telephone jack (EXT).  
In this case, the extension telephone adaptor (option) is required.

## LOCATION OF CONTROLS

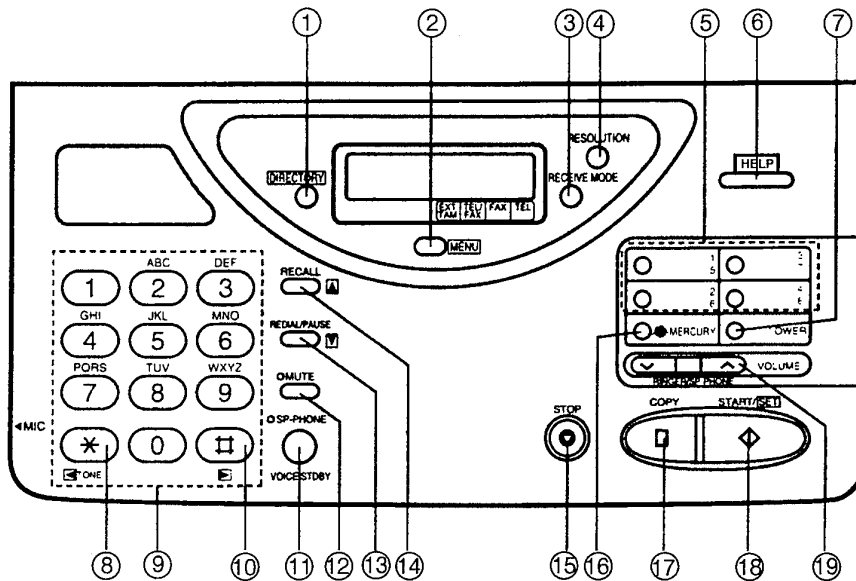
### Front view



### Rear view



## Control panel



- ① **DIRECTORY button**  
Used for speed dialling. Also used for the electronic telephone directory.
- ② **MENU button**  
Used to start and exit various programming.
- ③ **RECEIVE MODE button**  
Used to select the desired receiving mode.
- ④ **RESOLUTION button**  
Used to adjust the definition.
- ⑤ **Direct call station keys**  
Used for one-touch dialling. Also used as character keys when logo and station names are programmed.
- ⑥ **HELP button**  
Used to print an easy guide of operations.
- ⑦ **LOWER key**  
Used to access lower stations (5 to 8) for one-touch dialling.
- ⑧ **TONE/ < button**  
Used to temporarily change the dialling mode from pulse to tone during a dialling operation.  
Also used to move the cursor to the left while programming.
- ⑨ **Dial keypad**  
Used for dialling operation and parameter setting. Also used as character keys.
- ⑩ **Hash/ > button**  
Used to enter a space in your telephone number while programming.  
Also used to move the cursor to the right while programming.
- ⑪ **SP-PHONE/VOICE STDBY button**  
Used for on-hook dialling and voice contact features.
- ⑫ **MUTE button**  
Used for voice muting.
- ⑬ **REDIAL/PAUSE button**  
Used to redial the last dialled number. Also used to insert a pause into a phone number.
- ⑭ **RECALL button**  
Used to access some features of your host exchange.
- ⑮ **STOP button**  
Used to stop fax communication.
- ⑯ **MERCURY button**  
Used to store the Mercury access number and authorisation (PIN) code, and make calls using the Mercury network.
- ⑰ **COPY key**  
Used to start copying.
- ⑱ **START/SET button**  
Used to start fax communication. Also used to store parameters during programming.
- ⑲ **VOLUME button**  
Used to adjust the volume level of the ringer and speaker.

## **FEATURES**

### **General**

- Desktop type
- LCD (Liquid Crystal Display) readout
- Automatic paper cutter
- Silent ring fax recognition system
- Help function
- TAM (telephone answering machine) interface
- Copier function

### **Facsimile**

- Automatic document feeder (up to 15 sheets)
- 64-level halftones
- Resolution: standard/fine/super fine/halftone
- Delayed transmission
- Paper save function
- Overseas transmission mode
- Remote fax receiving using an extension phone
- Junk mail prohibitor

### **Integrated telephone system**

- One-touch dialer (10 phone numbers)
- 22-station speed dialer
- Hands-free speakerphone
- Electronic telephone directory



## MAINTENANCE ITEM

### 1. OUTLINE

MAINTENANCE AND REPAIRS ARE PERFORMED USING THE FOLLOWING STEPS.

#### 1) Periodic maintenance

Inspect the equipment periodically and if necessary, clean any contaminated parts.

#### 2) Check for breakdowns

Look for signs of trouble and consider how the problems arose.

If the equipment can still be used, perform a copying, self testing or communications testing.

#### 3) Check equipment

Perform a copying, self testing and communications testing to determine if the problem originates from the transmitter, the receiver or the telephone line.

#### 4) Determine causes

Determine the causes of equipment trouble by troubleshooting.

#### 5) Equipment repairs

Repair or replace the defective parts and take appropriate measures at this stage to ensure that the problem does not recur.

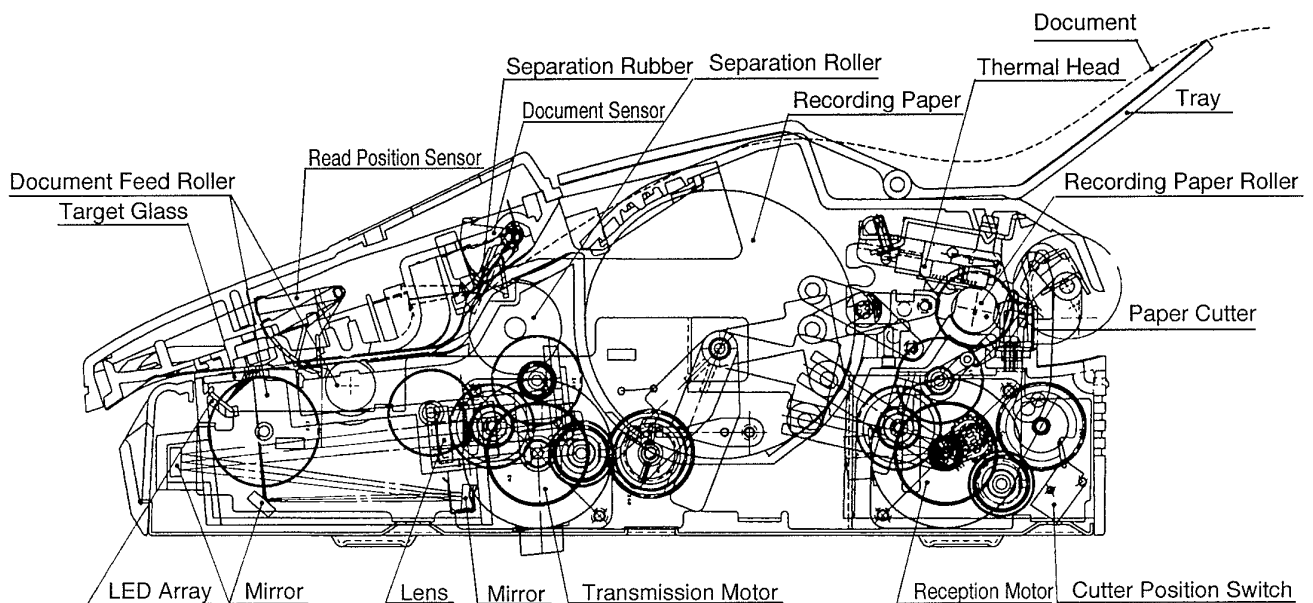
#### 6) Confirm normal operation of the equipment

After completing the repairs, conduct copying, self testing and communications testing to confirm that the equipment operates normally.

#### 7) Record keeping

Make a record of the measures taken to rectify the problem for future reference.

### 2. MAINTENANCE CHECK ITEMS



## 2-1. MAINTENANCE LIST

| NO. | OPERATION                                     | CHECK ITEM  | REMARKS          |
|-----|---|---|------------------|
| 1   | Document Path                                 | Remove any foreign matter such as paper.  | _____            |
| 2   | Rollers                                       | If the roller is dirty, clean it with a damp cloth then dry thoroughly.   | See page 11.     |
| 3   | Thermal Platen                                | If the platen is dirty, clean it with a damp cloth then dry thoroughly.<br>Remove the paper before cleaning.  | See page 69.     |
| 4   | Thermal Head                                  | If the thermal head is dirty, clean the printing surface with a cloth moistened with denatured alcohol (alcohol without water), then dry thoroughly.            | See pages 11,65. |
| 5   | LED Array                                     | If the LED array is dirty, clean the glass with a dry soft cloth.   | See page 11.     |
| 6   | Sensors                                       | Recording paper sensor (PS1), Document sensor (PI302), Read position sensor (PI301), Cover open sensor (PS3). JAM sensor (PS2)<br>Confirm operation of sensors. | See pages 45~47. |
| 7   | Mirrors and Lens                              | If the mirror and lens are dirty, clean it with a dry soft cloth.   | _____            |
| 8   | Abnormal, wear and tear or looseness of parts | Exchange the part.<br>Check the tightness of screws on all parts.   | _____            |

## 2-2. MAINTENANCE CYCLE

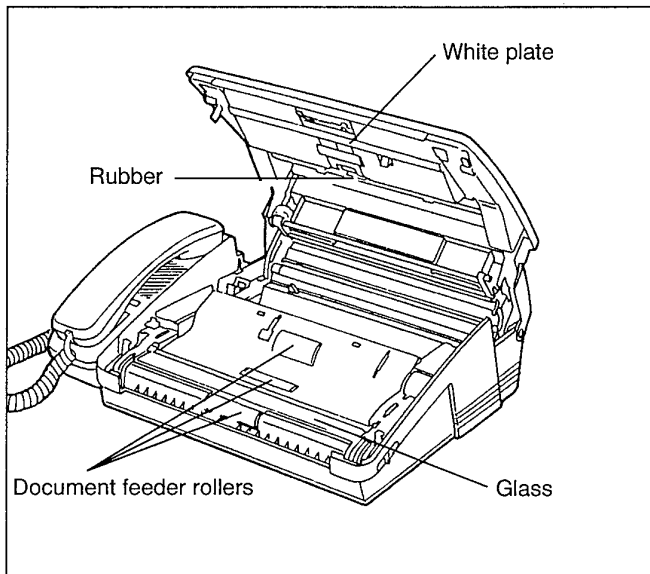
| No. | Items                                    | Cleaning |            | Replacement                    |            | Remarks |
|-----|--|----------|------------|--------------------------------|------------|---------|
|     |  | Cycle    | Procedure  | Cycle                          | Procedure  |         |
| 1   | Separation Roller<br>(Ref. No. 129)      | 3 months | See P. 11. | 7 years<br>(100,000 documents) | See P. 71. |         |
| 2   | Separation Rubber<br>(Ref. No. 67)       | 3 months | See P. 11. | 7 years<br>(100,000 documents) | -----      |         |
| 3   | Feed Roller<br>(Ref. No. 130,131)        | 3 months | See P. 11. | 7 years<br>(100,000 documents) | See P. 71. |         |
| 4   | Target Glass<br>(Ref. No. 187)           | 3 months | See P. 11. | 7 years<br>(100,000 documents) | See P. 65. |         |
| 5   | Thermal Head<br>(Ref. No. 46)            | 3 months | See P. 11. | 7 years<br>(100,000 documents) | -----      |         |
| 6   | Recording Paper Roller<br>(Ref. No. 105) | 3 months | See P. 69. | 7 years<br>(100,000 documents) | See P. 69. |         |
| 7   | Paper Cutter<br>(Ref. No. 110)           | -----    |            | 7 years<br>(100,000 documents) | See P. 69. |         |

↑  
These values are only standard ones and may vary depending on usage conditions.

### 3. MAINTENANCE

#### Cleaning the document feeder unit

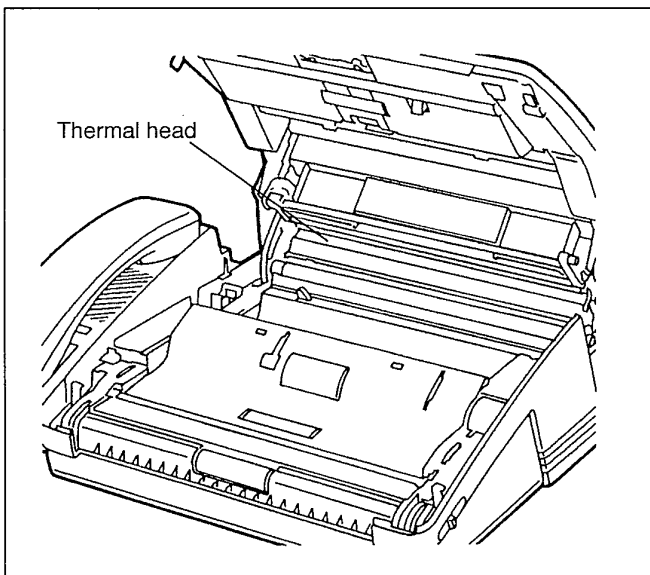
When the misfeeding occurs frequently or when dirty patterns or black bands appear on a copied or transmitted document, clean the document feeder rollers and the glass by following the steps below.



- (1) Disconnect the power cord and the telephone line cord.
- (2) Slide the lever to open the top cover.
- (3) Clean the rubber and document feeder rollers with a cloth moistened with isopropyl rubbing alcohol, then dry thoroughly.
- (4) Clean the glass and the white plate with a dry soft cloth.
- (5) Close the top cover carefully by pushing down on both ends gently.
- (6) Connect the power cord and telephone line cord.

#### Cleaning the thermal head

If dirty patterns or black bands appear on a copied or received document, clean the thermal head by following the steps below.



- (1) Disconnect the power cord and the telephone line cord.
- (2) Slide the lever forward to open the top cover.
- (3) Remove the recording paper roll from the unit.
- (4) Clean the thermal head with a cloth moistened with isopropyl rubbing alcohol, then dry thoroughly.
- (5) Re-install the recording paper roll, then close the top cover carefully by pushing down on both ends gently.
- (6) Connect the power cord and telephone line cord.

**Note:**

•To prevent malfunction due to static electricity, do not use a dry cloth and do not touch the thermal head directly with your finger directly.

### 3. COMMUNICATION ERROR FUNCTIONS

#### 3-1. OPERATION

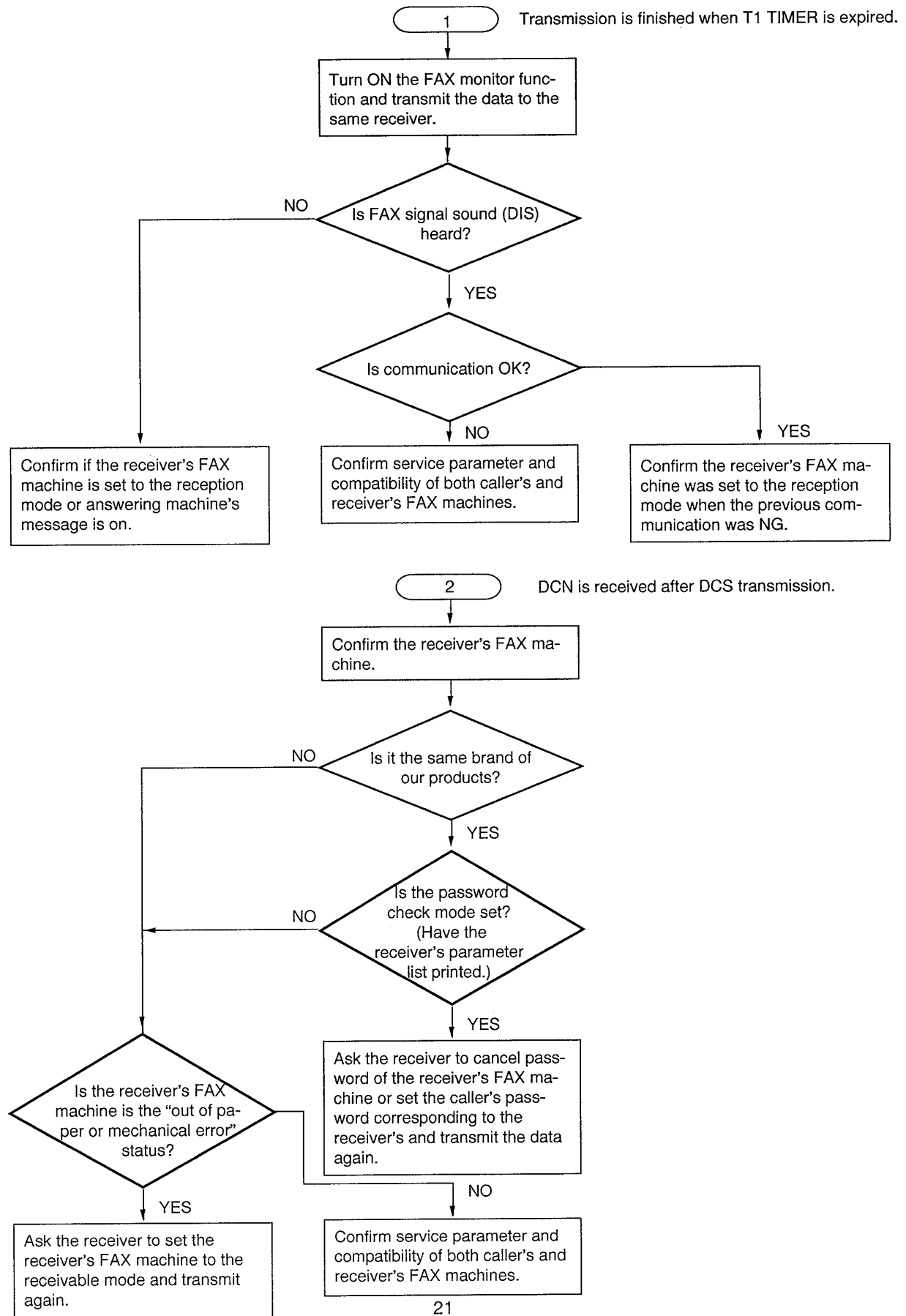
1. Press the MENU button 3 times.
2. press the START/SET button and ▼ (REDIAL/PAUSE) button 4 times.
3. Press the START/SET button.
4. Print out.

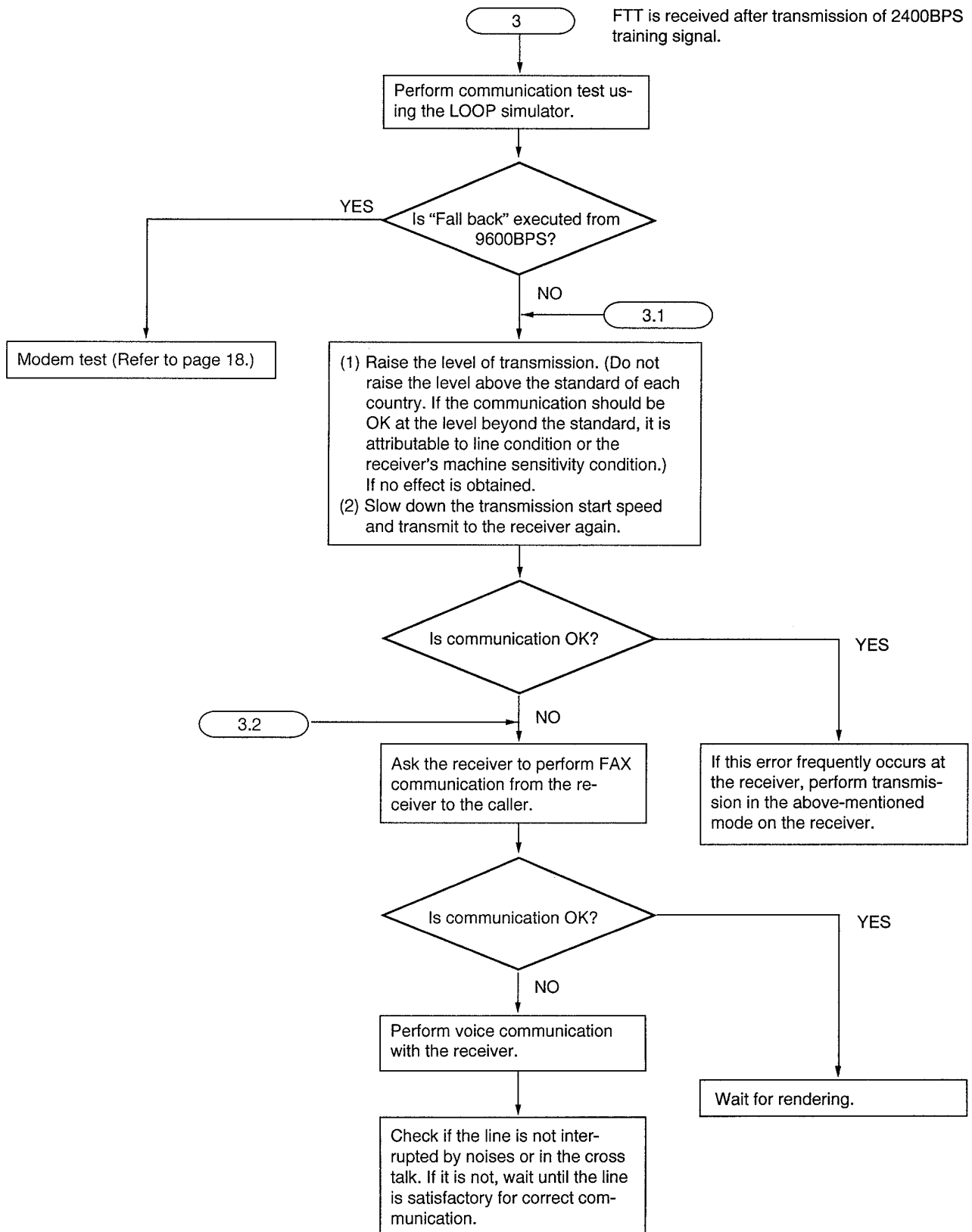
#### 3-2. ERROR CORD TABLE

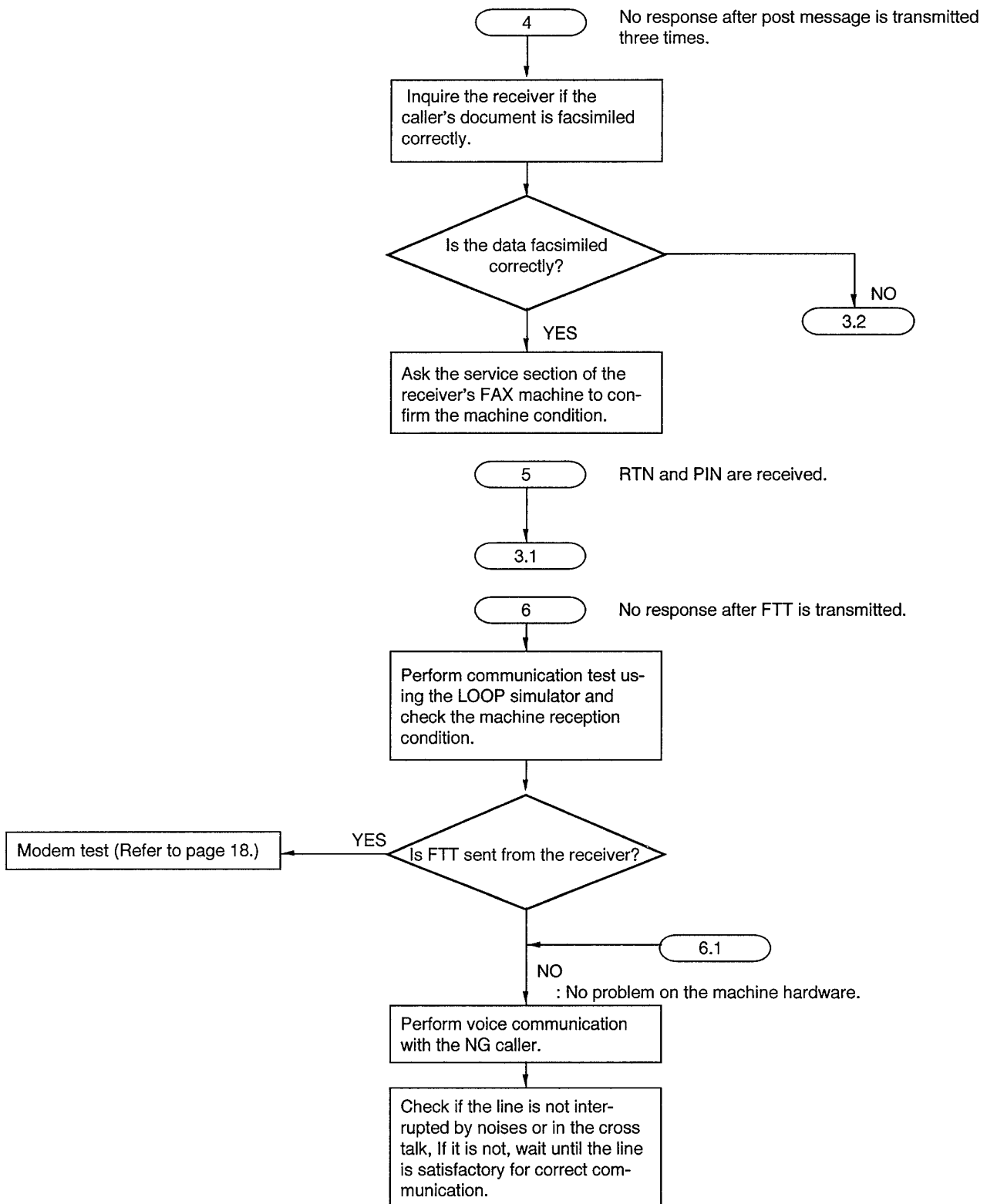
| CODE | RESULT               | MODE    | SYMPTOM  | Counter-measure |
|------|----------------------|---------|--|-----------------|
|      | PRESSED THE STOP KEY | TX & RX | Communication was interrupted with the STOP button             |                 |
|      | DOCUMENT JAMMED      | TX      | Document paper is jammed                                       |                 |
|      | NO DOCUMENT          | TX      | No document paper  |                 |
|      | PRINTER OVERHEATED   | RX      | Thermal head is overheated                                     |                 |
|      | PAPER OUT            | RX      | Out of thermal paper   |                 |
|      | THE COVER WAS OPENED | TX & RX | Cover is open  |                 |
|      | PAPER JAMMED         | RX      | Recording paper is jammed                                      |                 |
| 40   | NO RESPONSE          | TX      | Transmission is finished when T1 TIMER is expired              | 1               |
| 41   | COMMUNICATION ERROR  | TX      | DCN is received after DCS transmission                         | 2               |
| 42   | COMMUNICATION ERROR  | TX      | FTT is received after transmission of 2400BSP training signal  | 3               |
| 43   | COMMUNICATION ERROR  | TX      | No response after post message is transmitted three times      | 4               |
| 44   | COMMUNICATION ERROR  | TX      | RTN and PIN are received                                       | 5               |
| 46   | COMMUNICATION ERROR  | RX      | No response after FTT is transmitted                           | 6               |
| 48   | COMMUNICATION ERROR  | RX      | No post message  | 7               |
| 49   | COMMUNICATION ERROR  | RX      | RTN is transmitted   | 8               |
| 50   | COMMUNICATION ERROR  | RX      | PIN is transmitted (to PRI-Q)                                  | 8               |
| 51   | COMMUNICATION ERROR  | RX      | PIN is transmitted   | 8               |
| 52   | NO RESPONSE          | RX      | Reception is finished when T1 TIME is expired                  | 9               |
| 53   | COMMUNICATION ERROR  | TX      | DCN is received after transmission of NSC and DTC              | 10              |
| 54   | COMMUNICATION ERROR  | RX      | DCN is received after DIS transmission                         | 11              |
| 57   | COMMUNICATION ERROR  | TX      | 300BPS error   | 12              |
| 58   | COMMUNICATION ERROR  | RX      | DCN is received after FTT transmission                         | 13              |
| 59   | COMMUNICATION ERROR  | TX      | DCN responds to post message                                   | 14              |
| 64   | COMMUNICATION ERROR  | TX      | Polling is not possible  | 15              |
| 68   | COMMUNICATION ERROR  | RX      | No response at the other party after MCF or CFR is transmitted | 13              |
| 70   | COMMUNICATION ERROR  | RX      | DCN is received after CFR transmission                         | 13              |
| 72   | COMMUNICATION ERROR  | RX      | Carrier is cut when image signal is received                   | 16              |
| FF   | COMMUNICATION ERROR  | TX & RX | Modem error  | 12              |

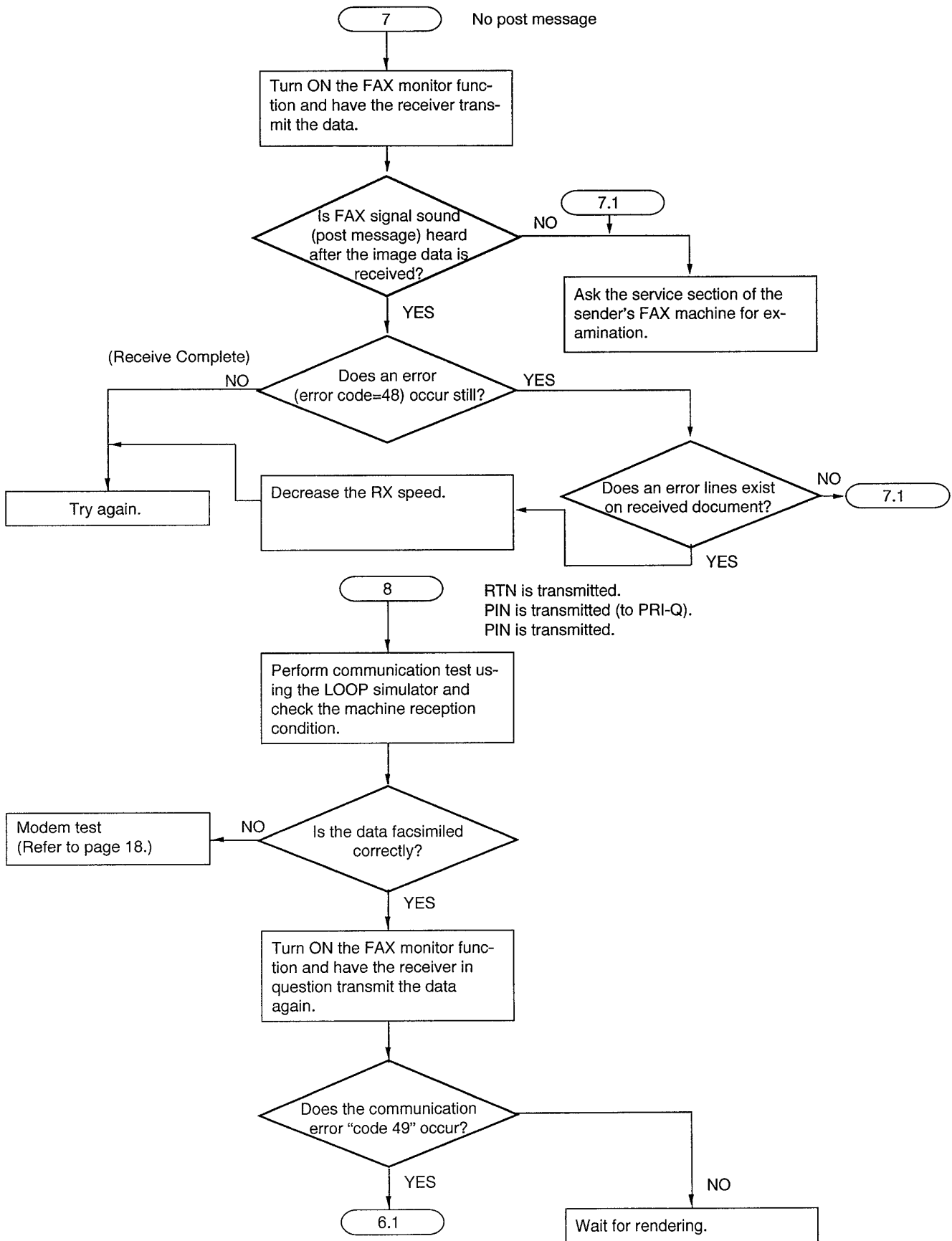
TX=TRANSMISSION RX=RECEPTION

## 3-3. COUNTERMEASURE

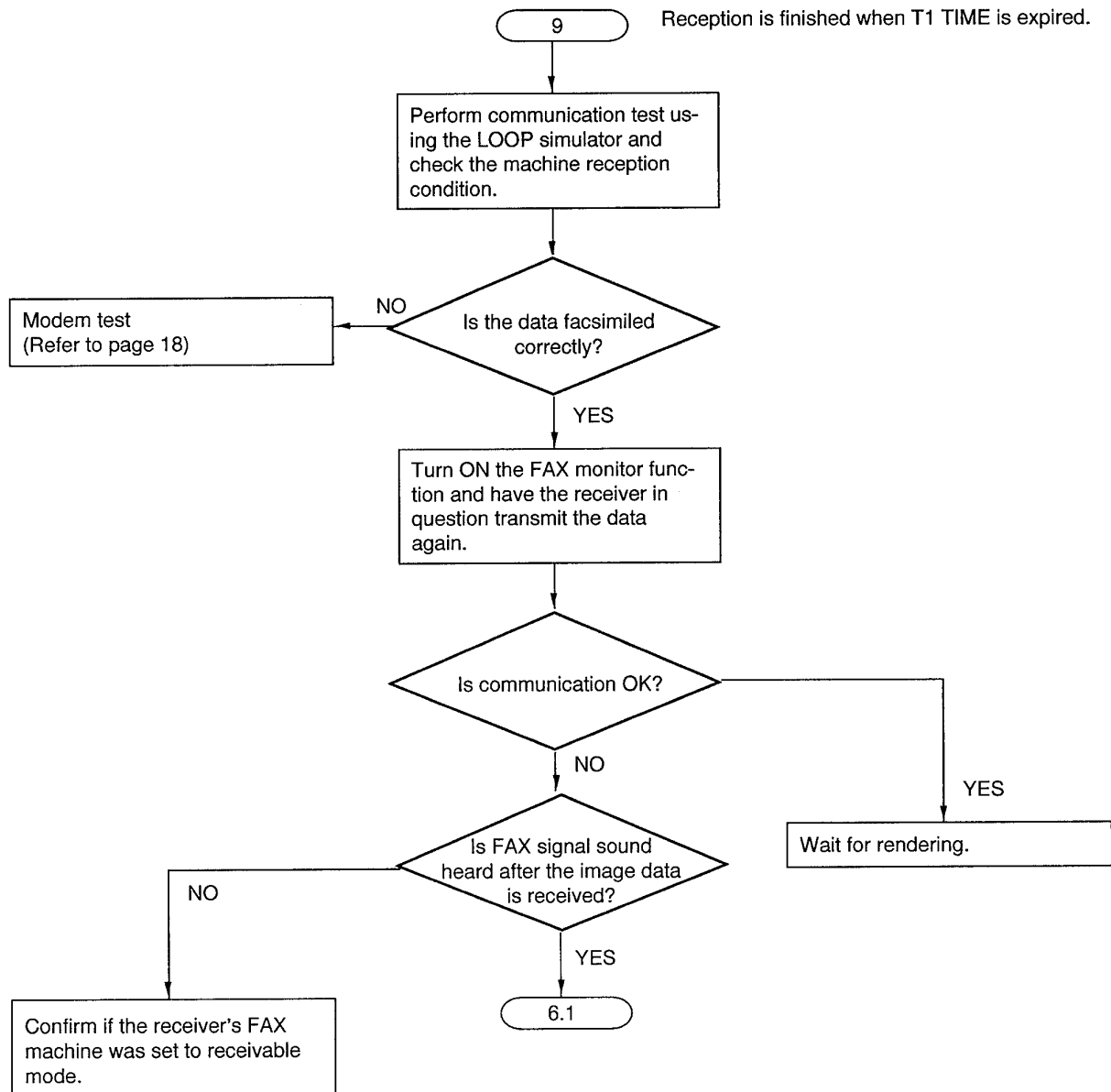


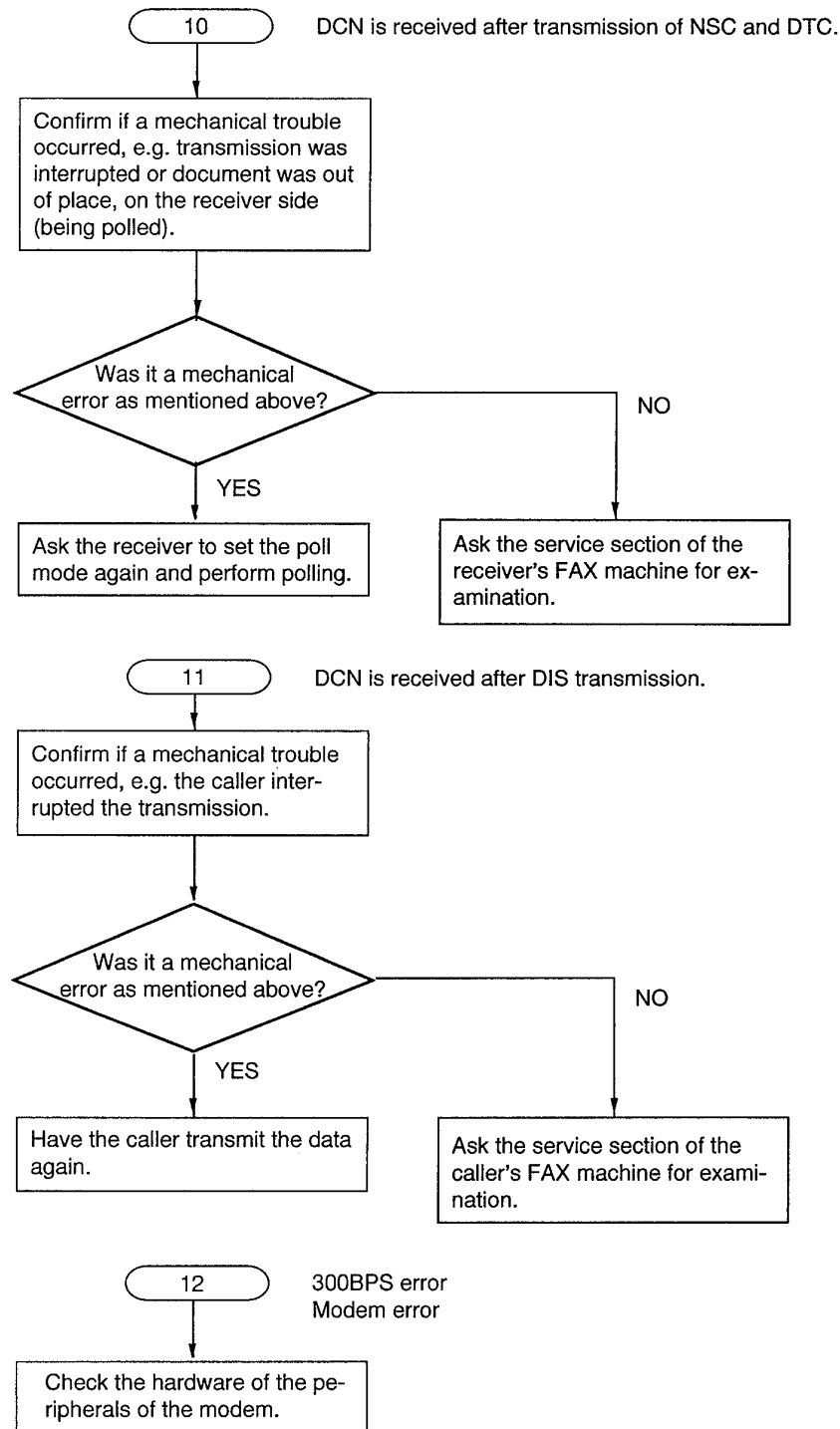


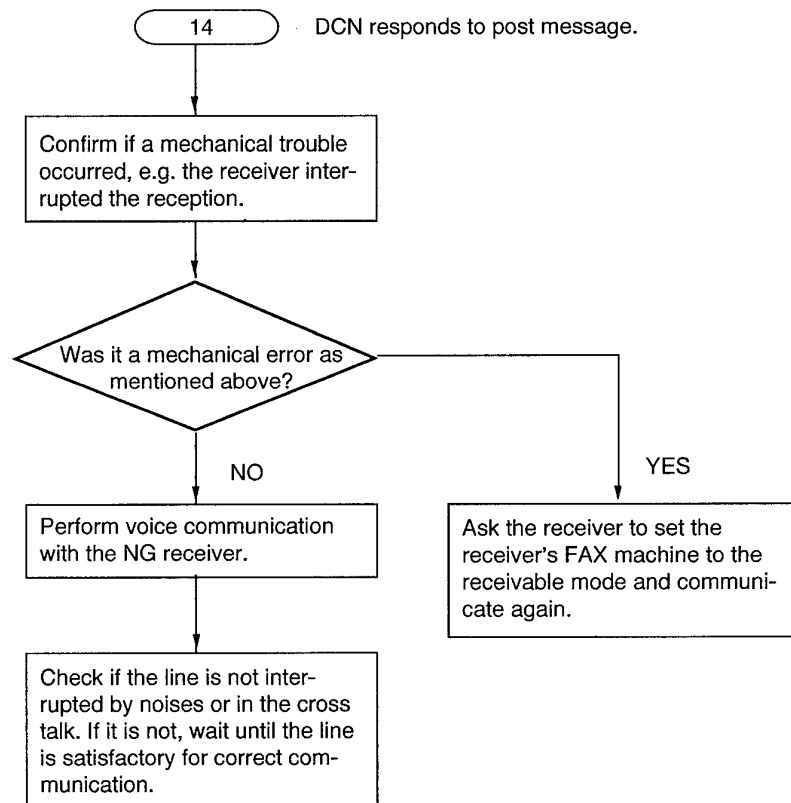
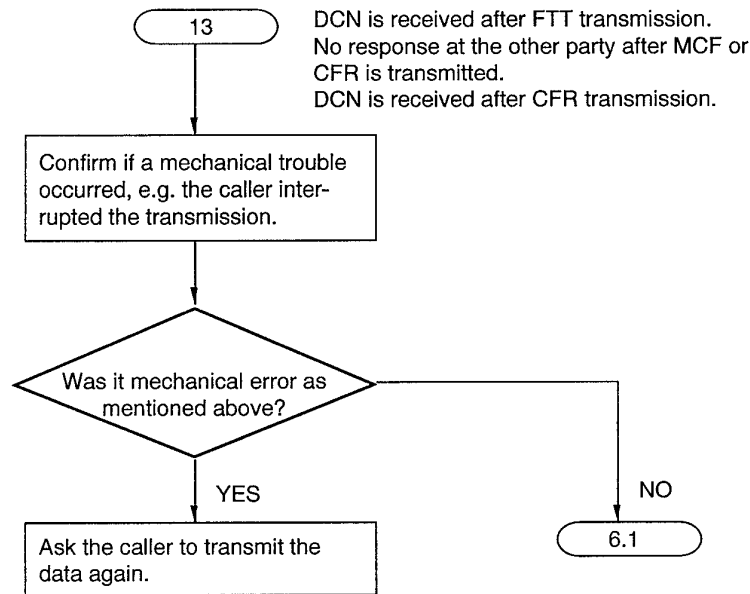


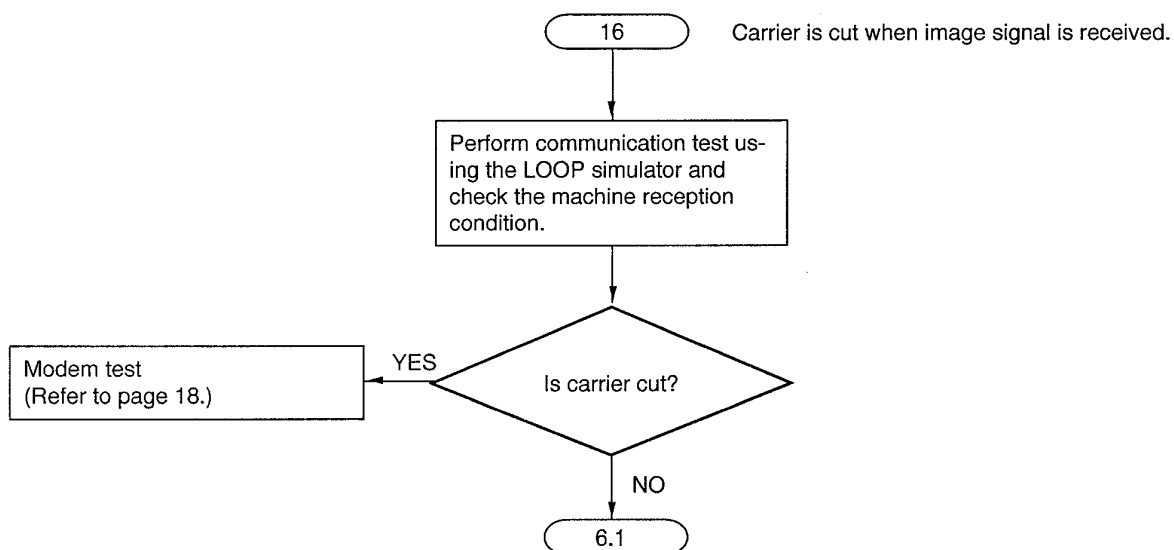
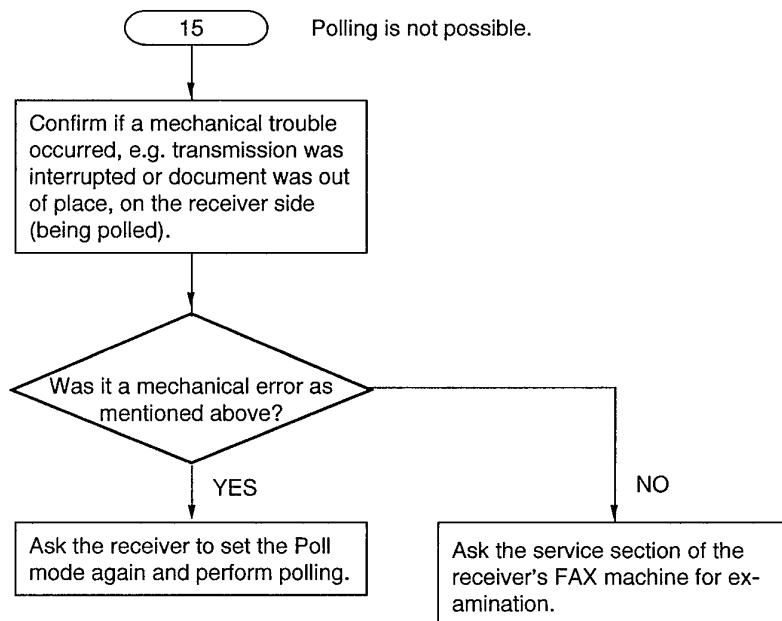












## 4. REMOTE PROGRAMMING

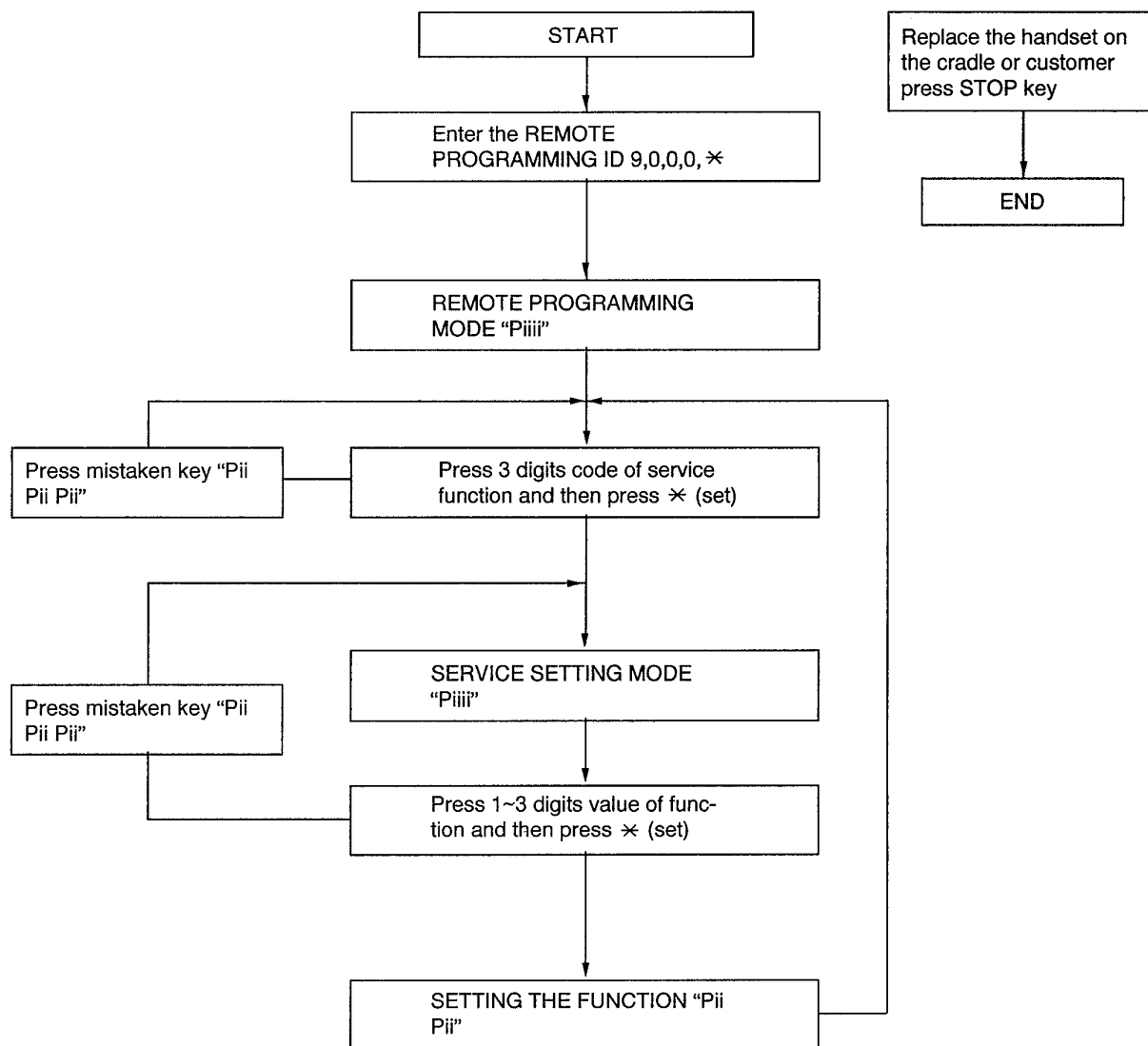
While a user is talking on the phone, a technician can set the functions of customer's unit from service center.

1. A call comes in service center.
2. A technician gets a claim from a customer.
3. He says to the customer "please press MENU button and wait for a moment".
4. The technician dial '9,0,0,0,\*' from his telephone.  
The customer's unit is set REMOTE PROGRAMMING MODE and generates remote beep sound.  
He hears "Piiii" (one long beep).
5. He presses 3 digits code of service function written in service manual by dial keypad.  
And presses \* (set).  
The customer's unit receives the service code.  
He hears "Piiii" (one long beep).
6. He presses 1~3 digits value of function written in service manual by dial keypad.  
And presses \* (set).  
The customer's unit receives the service value.  
He hears "Pii Pii" (double short beeps).
7. Then he can repeat from step 5.
8. When he wishes to end the REMOTE PROGRAMMING MODE, he replaces the handset on the cradle or the customer presses the STOP button.

### NOTE:

- 1) To enter the REMOTE PROGRAMMING MODE is necessary in Step 3. Because the unit can not easily enter the REMOTE PROGRAMMING by DTMF signal from the other party.
- 2) If he presses wrong buttons when his operation is in step 5 or 6. he hears "Pii Pii Pii" (triple short beeps). Then he can repeat from the same step.
- 3) When customer's unit finishes transmitting a list (No. 911,922,994,999), he can have a voice conversation.  
And he can continue the REMOTE PROGRAMMING MODE, but this feature is effective from version L.
- 4) When customer's unit start transmitting a list (No. 991,992,994,999), he does not hear "Pii Pii" (double short beeps).  
The unit generate CNG sound.

#### 4-1. SUMMARY OF REMOTE PROGRAMMING MODE



## 4-2. PROGRAM MODE TABLE

| Code | Function                                    | Set Value                       | Default | Remote setting |
|------|---|---------------------------------|---------|----------------|
| 01   | Set date and time                           | -----                           | 95/1/1  | NG             |
| 02   | Your logo                                   | up to 30 digits                 | PANASO  | NG             |
| 03   | Your telephone number                       | up to 20 digits                 | (NONE)  | NG             |
| 04   | Print transmission report                   | ERROR/ON/OFF                    | ERROR   | OK             |
| 06   | TEL/FAX delayed ring                        | 1 to 4 rings                    | 2       | OK             |
| 07   | FAX ring count                              | 1 to 4 rings                    | 2       | OK             |
| 11   | Remote TAM activation                       | ON/OFF ID = up to 5 digits (11) | OFF/11  | NG             |
| 21   | Logo position                               | OUT/IN/OFF                      | OUT     | OK             |
| 22   | Journal auto print                          | ON/OFF                          | ON      | OK             |
| 23   | Overseas mode                               | ON/OFF                          | OFF     | NG             |
| 24   | Junk mail prohibitor                        | ON/OFF ID = 2 digits (22)       | OFF/22  | NG             |
| 25   | Delayed transmission                        | ON/OFF                          | OFF     | NG             |
| 30   | Silent FAX recognition ring                 | 3 to 6 rings                    | 3       | OK             |
| 33   | Paper save function                         | ON/OFF                          | OFF     | NG             |
| 34   | Extension copy                              | "COPY" push                     | -----   | NG             |
| 35   | Recall mode                                 | T_BR/E_RE                       | T_BR    | OK             |
| 40   | Silent detection                            | ON/OFF                          | ON      | OK             |
| 41   | Remote FAX activation code                  | up to 4 digits                  | **      | NG             |
| 46   | Original                                    | NORMAL/LIGHT/DARKER             | NORMAL  | NG             |
| 70   | Reset mercury dial memory                   | YES/NO                          | NO      | NG             |
| 80   | Set default                                 | YES/NO                          | NO      | NG             |
| 501  | Pause time set                              | 001~600×100msec                 | 035     | OK             |
| 502  | Flash time set                              | 01~99×10msec                    | 08      | OK             |
| 503  | Dial speed set                              | 1:10/2:20pps                    | 10      | OK             |
| 520  | CED frequency select                        | 1:2100/2:1100Hz                 | 2100    | OK             |
| 521  | International mode select                   | 1:ON/2:OFF                      | ON      | OK             |
| 522  | Auto standby select                         | 1:ON/2:OFF                      | ON      | OK             |
| 523  | Receive equalizer select                    | 1:ON/2:OFF                      | ON      | OK             |
| 550  | Memory clear                                | "START" push                    | -----   | NG             |
| 551  | ROM check                                   | "START" push                    | -----   | NG             |
| 552  | DTMF signal tone transmit select            | 1:ON/2:OFF                      | OFF     | NG             |
| 553  | Monitor on FAX communication select         | 1:OFF/2:P-B/3:ALL               | OFF     | NG             |
| 554  | Modem test                                  | "START" push                    | -----   | NG             |
| 555  | Scanner test                                | "START" push                    | -----   | NG             |
| 556  | Motor test                                  | "START" push                    | -----   | NG             |
| 557  | LED test                                    | "START" push                    | -----   | NG             |
| 558  | LCD test                                    | "START" push                    | -----   | NG             |
| 559  | Paper jam detection select                  | 1:ON/2:OFF                      | ON      | OK             |
| 560  | Cutter select                               | 1:ON/2:OFF                      | OFF     | NG             |
| 561  | Key test                                    | "START" push                    | -----   | NG             |
| 562  | Cutter test                                 | "START" push                    | -----   | NG             |
| 563  | CCD position adjustment value set           | 00~30                           | -----   | OK             |
| 565  | LCD contrast                                | 1:NORMAL/2:LIGHT/3:DARK         | NORMAL  | OK             |
| 570  | Break % select                              | 1:61/2:67%                      | 67%     | NG             |
| 571  | ITS auto redial time set                    | 00~99                           | 03      | OK             |
| 572  | ITS auto redial line disconnection time set | 001~999                         | 065     | OK             |
| 573  | Remote turn-on ring number set              | 01~99                           | 20      | OK             |
| 574  | Dial tone detection set                     | 1:ON/2:OFF                      | OFF     | OK             |
| 579  | Detect bell type                            | 1:TYPE I/2:TYPE II              | TYPE I  | OK             |
| 586  | White line skip 2 select                    | 1:ON/2:OFF                      | ON      | OK             |
| 587  | White line skip 2 select                    | 1:ON/2:OFF                      | ON      | OK             |
| 589  | TCF check mode                              | 1:NORMAL/SEVERE                 | NORMAL  | OK             |
| 590  | FAX auto redial time set                    | 00~99                           | 03      | OK             |
| 591  | FAX auto redial line disconnection time set | 001~999                         | 065     | OK             |
| 592  | CNG transmit select                         | 1:OFF/2:ALL/3:AUTO              | All     | OK             |
| 593  | Time between CED and 300 bps                | 1:75/2:500/3:1s                 | 75ms    | OK             |
| 594  | Overseas DIS detection select               | 1:1st/2:2nd                     | 1st     | OK             |
| 595  | Receive error limit value set               | 001~999                         | 100     | OK             |
| 596  | Transmit level set                          | -15~00dBm                       | 10      | OK             |
| 597  | Transmit speed 2400bps fixed mode select    | 1:ON/2:OFF                      | OFF     | OK             |

**KX-F2200E-G/KX-F2200E-W**

| Code | Function                                      | Set Value                      | Default | Remote setting |
|------|---|--------------------------------|---------|----------------|
| 700  | Ext. TAM OGM time                             | 01~99sec                       | 10      | OK             |
| 701  | Silent detect time                            | 01~99×100msec                  | 40      | OK             |
| 702  | Ext. TAM ring count                           | 0~9                            | 5       | OK             |
| 717  | Transmit speed select                         | 1:9600/2:7200/3:4800/4:2400bps | 9600bps | OK             |
| 718  | Receive speed select                          | 1:9600/2:7200/3:4800/4:2400bps | 9600bps | OK             |
| 719  | Ringer off in TEL/FAX mode                    | 1:ON/2:OFF                     | ON      | OK             |
| 720  | Manual tone detect                            | 1:ON/2:OFF                     | OFF     | OK             |
| 721  | Pause tone detect                             | 1:ON/2:OFF                     | ON      | OK             |
| 722  | Redial tone detect                            | 1:ON/2:OFF                     | ON      | OK             |
| 732  | Auto disconnect cancel time                   | 1:350msec/2:1800msec/3:OFF     | 350msec | OK             |
| 771  | T1 timer                                      | 1:35sec/2:60sec                | 35sec   | OK             |
| 815  | Sensor and check                              | "START" push                   | -----   | NG             |
| 890  | First ring back tone generate in TEL/FAX mode | 1:ON/2:OFF                     | ON      | OK             |
| 991  | Transmit basic list                           | 1:START                        | -----   | OK             |
| 992  | Transmit advanced list                        | 1:START                        | -----   | OK             |
| 994  | Transmit journal report                       | 1:START                        | -----   | OK             |
| 999  | Transmit service list                         | 1:START                        | -----   | OK             |



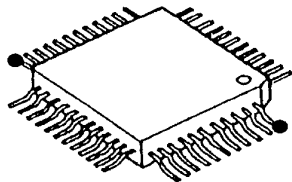
## HOW TO REPLACE FLAT PACKAGE IC

### ■ PREPARATION

- SOLDER ..... Sparkle Solder 115A-1, 115B-1  
OR  
Almit Solder KR-19, KR-19RMA
- Soldering iron ..... Recommended power consumption will be between 30 W to 40 W.  
Temperature of Copper Rod 662  $\pm 50$  °F(350  $\pm 10$  °C)  
  
(An expert may handle 60~80 W iron, but a beginner might damage the foil by overheating.)
- Flux ..... HI115      Specific gravity 0.863  
(Original flux will be replaced daily.)

### ■ PROCEDURE

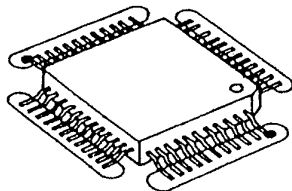
1. Temporarily fix the FLAT PACKAGE IC by Soldering on two marked pins.



● ..... Temporary soldering point.

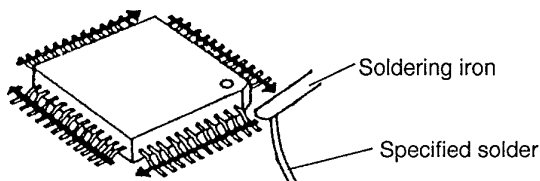
\*Accurate setting of the IC to the corresponding soldering foil is vital.

2. Apply flux to the all pins of the FLAT PACKAGE IC.



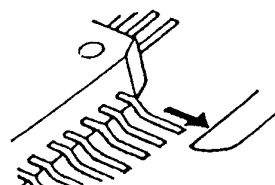
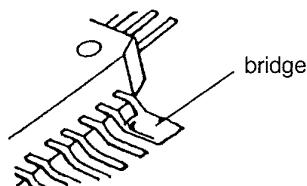
○ ..... Flux

3. Solder the specified solder in the direction of the arrow, while slide the soldering iron.



### ■ MODIFICATION PROCEDURE OF BRIDGE

1. Re-solder slightly on bridged portion.
2. Remove any remaining solder along the pins using soldering iron as shown below.



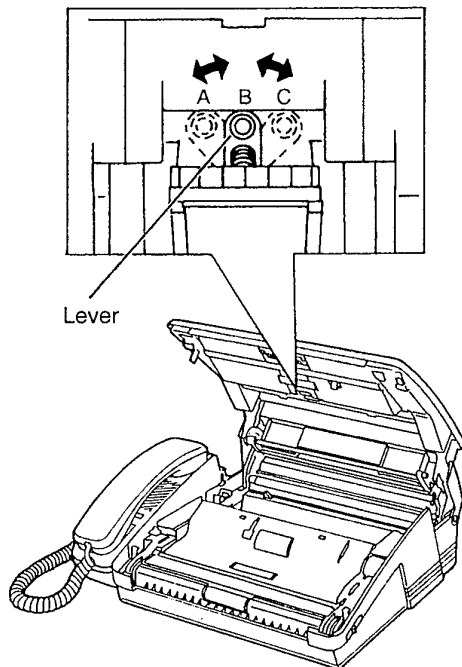
## ADJUSTMENTS

### 1. TABLE OF TEST EQUIPMENTS AND TOOL

| No. | Test Equipment and Jig Name | Jig No.              |
|-----|-----------------------------|----------------------|
| 1   | Oscilloscope                | —                    |
| 2   | CCD Tool                    | PQZZF500M            |
| 3   | Extension Cord              | PQZZ2K12Z, PQZZ8K18Z |
| 4   | Spring Height Tool          | PQZZ2F500M           |

### 2. ADJUSTING THE FEEDER PRESSURE

If misfeeding of document, such a multiple feeding or no feeding, occurs frequently, try to adjust the feeder pressure by following steps below.



- (1) Open the top cover.
- (2) Shift the position of the lever by using an instrument with a pointed end, like a clip or ball-point pen.  
Position A: Case of no feeding  
Position B: Standard position  
Position C: Case of multiple feeding
- (3) Close the top cover carefully by pressing down on the ends gently.

### 3. CONFIRMATION OF SEPARATION SPRING

1. Open the operation grille.
2. Check the highest level of the separation spring with the spring height tool (PQZZ2F500M). Please make sure that the separation spring does not touch the tool during this operation. (Both right and left) (See Fig. 1).
3. Check the lowest level of the separation spring with the opposite side of the spring height tool. Please make sure that the separation spring touches the tool during this operation. (Both right and left) (See Fig. 2).

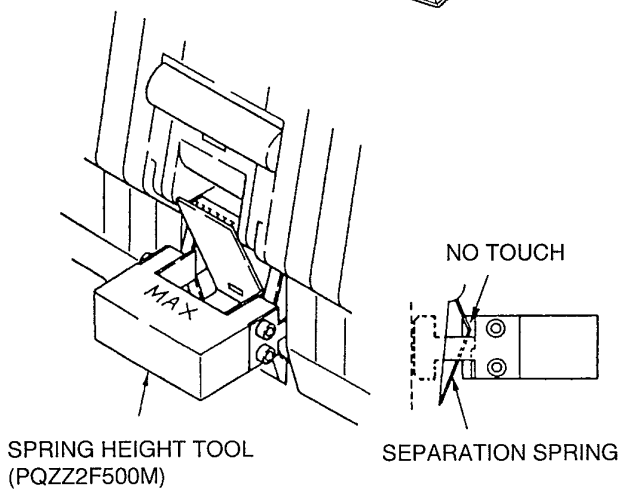


Fig. 1

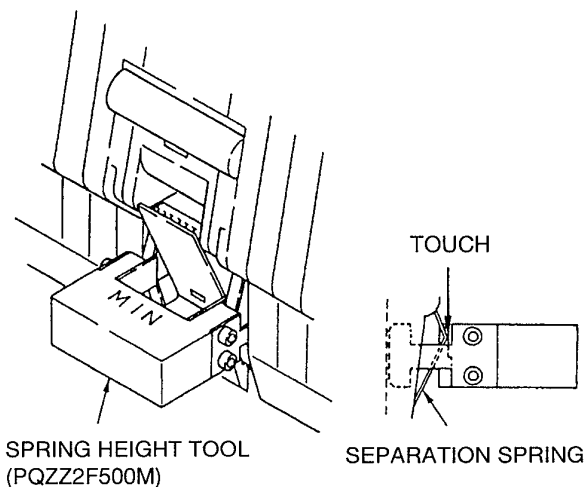


Fig. 2

## 4. CCD ADJUSTMENTS

Perform the following adjustment after replacing lens and CCD board.

### PREPARATION:

- 1) Remove the CCD unit from set. (Refer to page 70)
- 2) Make oscilloscope connections as shown in next page.
- 3) Attach the CCD TOOL on the CCD unit.
- 4) Connect between CCD unit and digital board with extension cord (Part No. PQZZ8K18Z). (Refer to next page).
- 5) Connect between LED array and digital board with extension cord (Part No. PQZZ2K12Z). (Refer to next page).
- 6) Connect AC cord.
- 7) Press the MENU button.
- 8) Press the #,9,0,0,0, and  $\times$  buttons.
- 9) Press the 5,5 and 5 buttons.

### Notes:

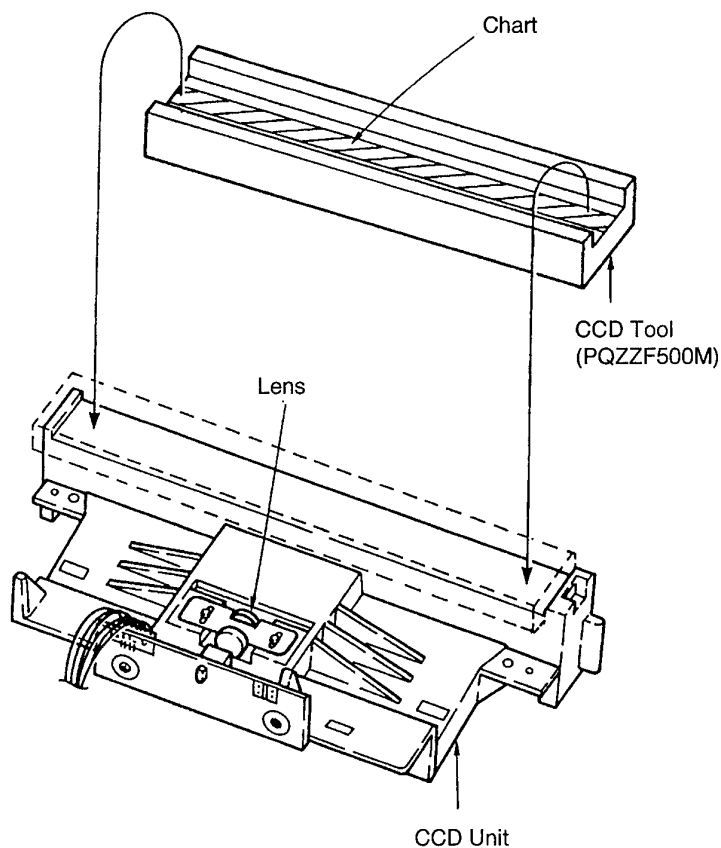
- 1) When replacing the lens, pay attention to the markings on the lens are white and yellow.  
The number of the CCD spacers to use differs depending on the marking as follows.  
\* Refer to page 172 for the location of the CCD spacer.

- 2) Install the lens so that the marking (White or Yellow) on it is upper side.
- 3) Do not touch the glass face of the lens with the bare hands.

### Cleaning:

If the lens is dirty, clean it with a dry soft cloth.

| Marking on the lens | Number of CCD Spacer |
|---------------------|----------------------|
| White               | 0 (not used)         |
| Yellow              | 1                    |

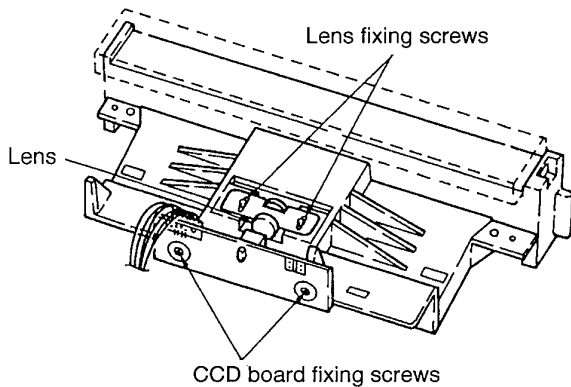
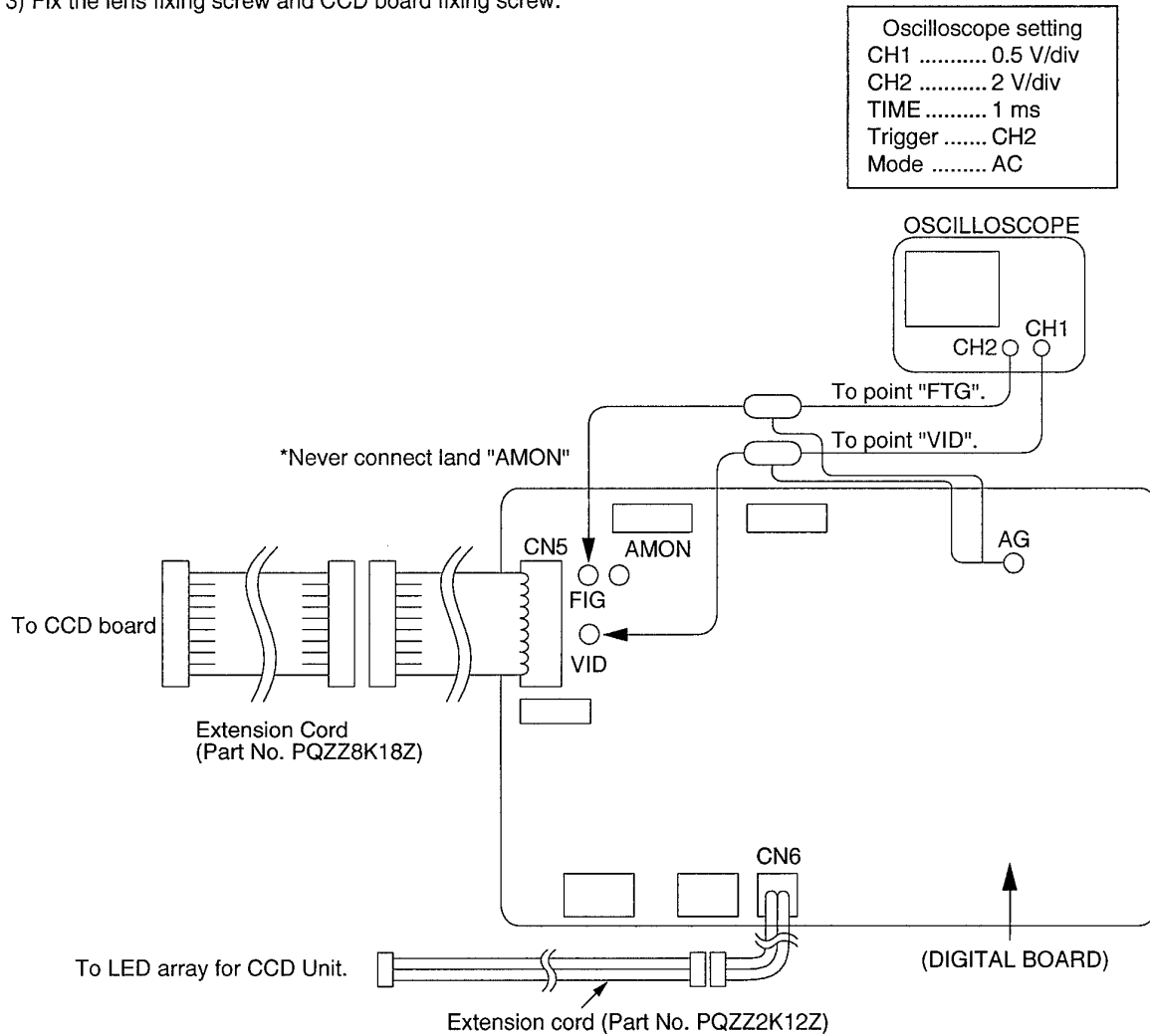
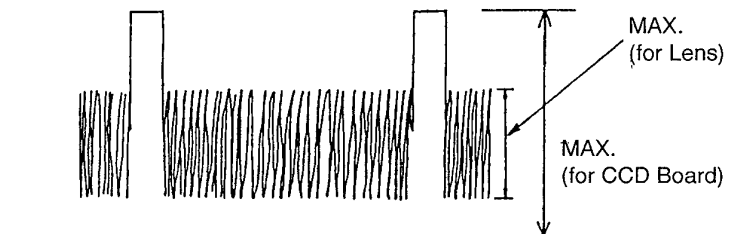


### Note:

Please adjust with covering topside of the lens by hands in order not to let in outdoor daylight.

**ADJUSTMENT:****LENS AND CCD READ POSITION ADJUSTMENT**

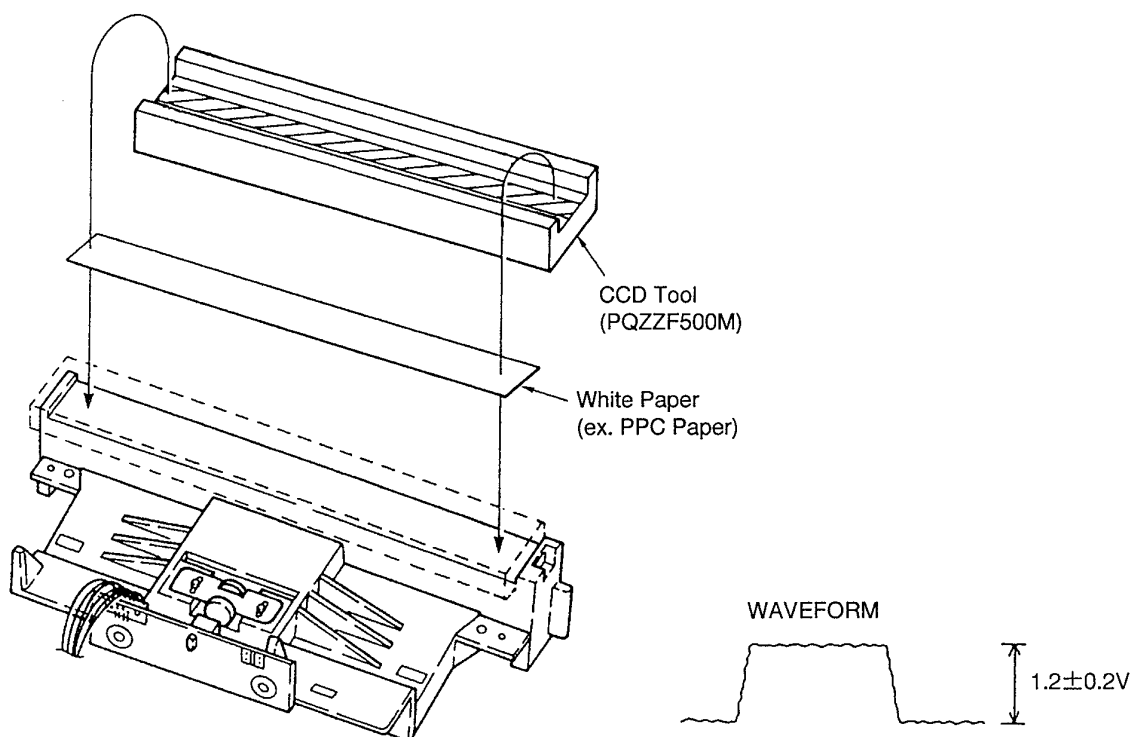
- 1) Loosen the lens fixing screw and CCD board fixing screw.
- 2) Adjust the position of the lens and CCD board so that the waveform appears as shown in the figure below.
- 3) Fix the lens fixing screw and CCD board fixing screw.

**WAVEFORM**

## WHITE LEVEL ADJUSTMENT

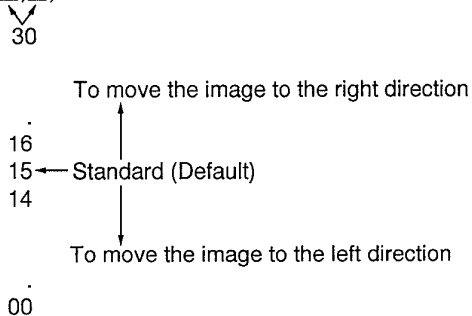
- 1) Remove the CCD TOOL from CCD unit.
- 2) Attach the white paper on the CCD unit.
- 3) Attach the CCD TOOL on the CCD unit.
- 4) Adjust VR801 on the CCD board so that the waveform becomes  $1.2 \pm 0.2V$ .

**Notes:** 1. After the adjustment is finished, assemble the unit by reversing above procedure.  
 2. Please adjust with covering topside of the lens by hands in order not to let in outdoor daylight.  
 3. If you have no instrument to repair, trim off the chart on next page, then attach on the target glass.  
 (This is a temporary treatment. You should use an instrument for this adjustment purpose, if you require an accurate repairment.)



## 5. DOCUMENT READ START POSITION ADJUSTMENT

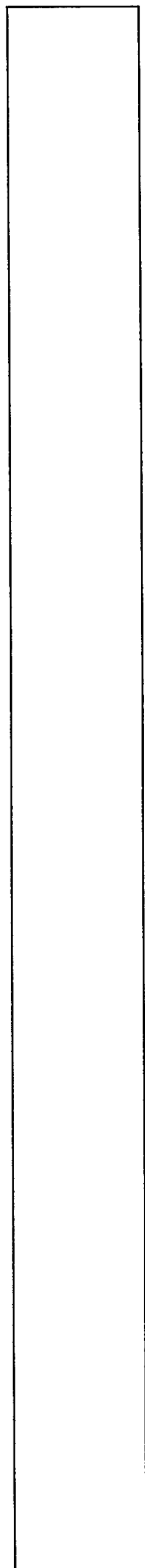
- 1) Connect AC cord.
- 2) Copy the document, and confirm the read start position of the document.
- 3) If get out of position, adjust the read position.
- 4) Press the MENU button.
- 5) Press the #, 9, 0, 0, 0, \* and 5, 6, 3 buttons.
- 6) Press the ☐, ☐, SET and MENU buttons.



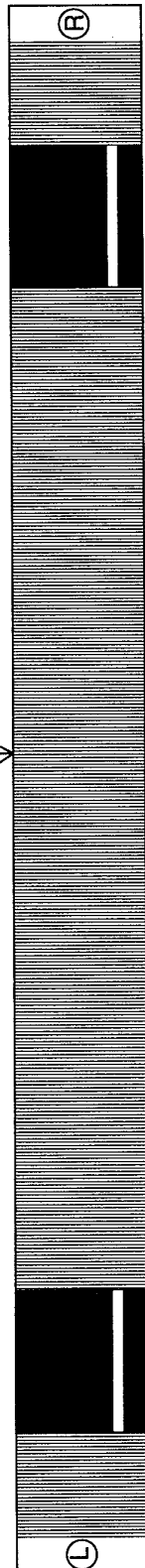
The starting position of reading shifts 1 mm as number of changes.

(for white level adjustment)

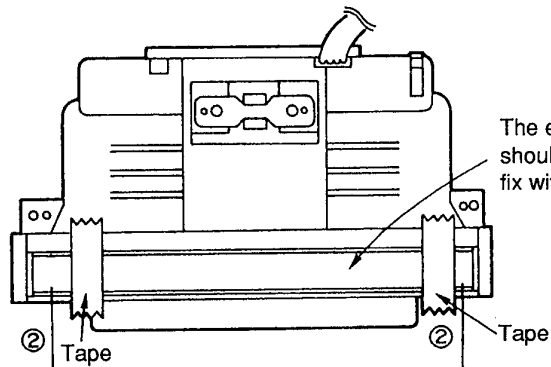
(for lens and CCD read position adjustment)



LED Array →  
Side



← edge of the glass



①

Reverse

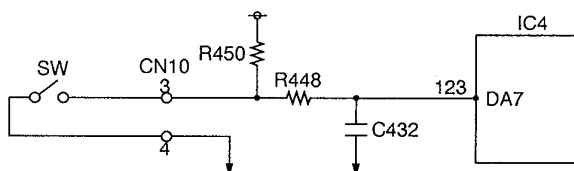


Make sure the position of ① and ②.

KX-F2200E-G/KX-F2200E-W

**[Anti Curl Position Switch]**

When an anti-curl shaft is set to home position, SW becomes ON and IC4-123 pin (Digital) becomes low level.



|                  | SW  | IC4-123 pin |
|------------------|-----|-------------|
| Home Position    | ON  | Low level   |
| No Home Position | OFF | High level  |

## 4. MODEM SECTION

### 4-1. FUNCTION

The unit uses a 1 chip modem (IC5), enabling it to act as an interface between the control section for FAX sending and receiving, and the telephone line. During a sending operation, the digital image signals are modulated and sent to the telephone line, while during a receiving operation, the analog image signals which are received via the telephone line are demodulated and converted into digital image signals. The communication format and procedures for FAX communication are standardized by ITU-T. This 1 chip modem (IC5) has hardware which sends and detects all of the necessary signals for FAX communication.

It can be controlled by writing commands from the CPU (IC1) to the register in the modem (IC5).

This modem (IC5) also sends DTMF signals, generates a call tone (from the speaker), and detects a busy tone and dial tones.

Overview of Facsimile Communication Procedures (ITU-T Recommendation):

#### 1) ON ITU-T (International Telecommunications Union)

The No. XIV Group of ITU-T, one of the four permanent organizations of the International Telecommunications Union (ITU), investigates and make recommendations on international standards for facsimile.

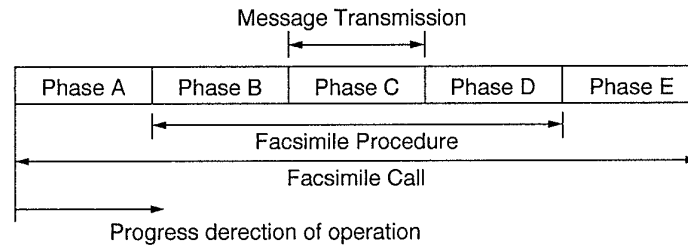
#### 2) Definition of Each Group

- Group I (G1)  
A-4 size documents official without using formats which reduce the band width of signal sent over telephone lines.  
Determined in 1968.  
Transmission for about 6 minutes at scanning line density of 3.85 lines/mm.
- Group II (G2)  
Using reduction technology in the modulation/demodulation format, A-4 size document is sent at an official scanning line density of 3.85 lines/mm for about 3 minutes.  
Methods to suppress redundancy are not used.  
Determined in 1976.
- Group III (G3)  
Method of suppressing redundancy in the image signal prior to modulation is used. A-4 size document is sent within about one minute.  
Determined in 1980.
- Group N (G4)  
Transmission is via data network. Method is provided for suppressing redundancy in signals prior to transmission, and error-free reception of transmission is possible.  
The scope of these facsimile applications is not limited simply to transmission of written statements. Through symbiotic linkages with other communications methods, it can be expected to expand to include integrated services.



### 3) Facsimile Call Time Series

As shown in the following diagram, the facsimile call time series is divided into five phases.



**Phase A :** Call setting

Call setting can be manual/automatic.

**Phase B :** Pre-message procedure

Phase B is a pre-processing procedure and a sequence for confirming status of terminal, transmission route, etc. and for terminal control. It implements terminal preparation status, determines and displays terminal constants, confirms synchronization status, etc. and prepares for transmission of facsimile messages.

**Phase C :** Message transmission

Phase C is the procedure for transmission of facsimile messages.

**Phase D :** Post message procedure

Phase D is the procedure for confirming that the message is completed and received. In the case of continuous transmission, return is made repeatedly to phase B or phase C for transmission.

**Phase E :** Call retrieval

Phase E is the procedure for call retrieval, that is, for circuit disconnection.

### 4) Concerning Transmission of Time

$$\text{Transmission Time} = \text{Control Time} + \text{Image Transmission Time} + \text{Hold Time}$$

Transmission time consists of the following.

**Control time :** This is time at the start of transmission when functions at the sending and receiving sides are confirmed, transmission mode is established, and transmission and reception are synchronized.

**Image transmission time:**

This is the time required for transmission of document contents (image data). In general, this time is recorded in the catalog, etc.

**Hold time:** This is the time required after the document contents have been sent to confirm that the document was in fact sent, and to check for telephone reservations and/or the existence of continuous transmission.

### 5) Facsimile Standard

| Item   | Telephone Network Facimile   |
|--|--|
|  | G3 Machine   |
| Connection Control Mode                      | Telephone Network Signal Mode  |
| Terminal Control Mode                        | T. 30 Binary   |
| Facsimile Signal Format                      | Digital  |
| Modulation Mode                              | PSK (V. 27 ter) or QAM (V. 29)   |
| Transmission Speed                           | 300 bps (control Signal)<br>2400, 4800, 7200, 9600 bps (FAX Signal)                          |
| Redundancy Compression Process (Coding Mode) | 1 dimension : MH Mode<br>2 dimension : MR Mode (K=2.4)                                       |
| Resolution                                   | Main Scan : 8 pel/mm<br>Sub Scan : 3.85, 7.7l/mm   |
| Line Synchronization Signal                  | EOL Signal   |
| 1 Line Transmission Time [ms/line]           | Depends on degree of data reduction.<br>Minimum Value : 10, 20<br>Can be recognized in 40ms. |

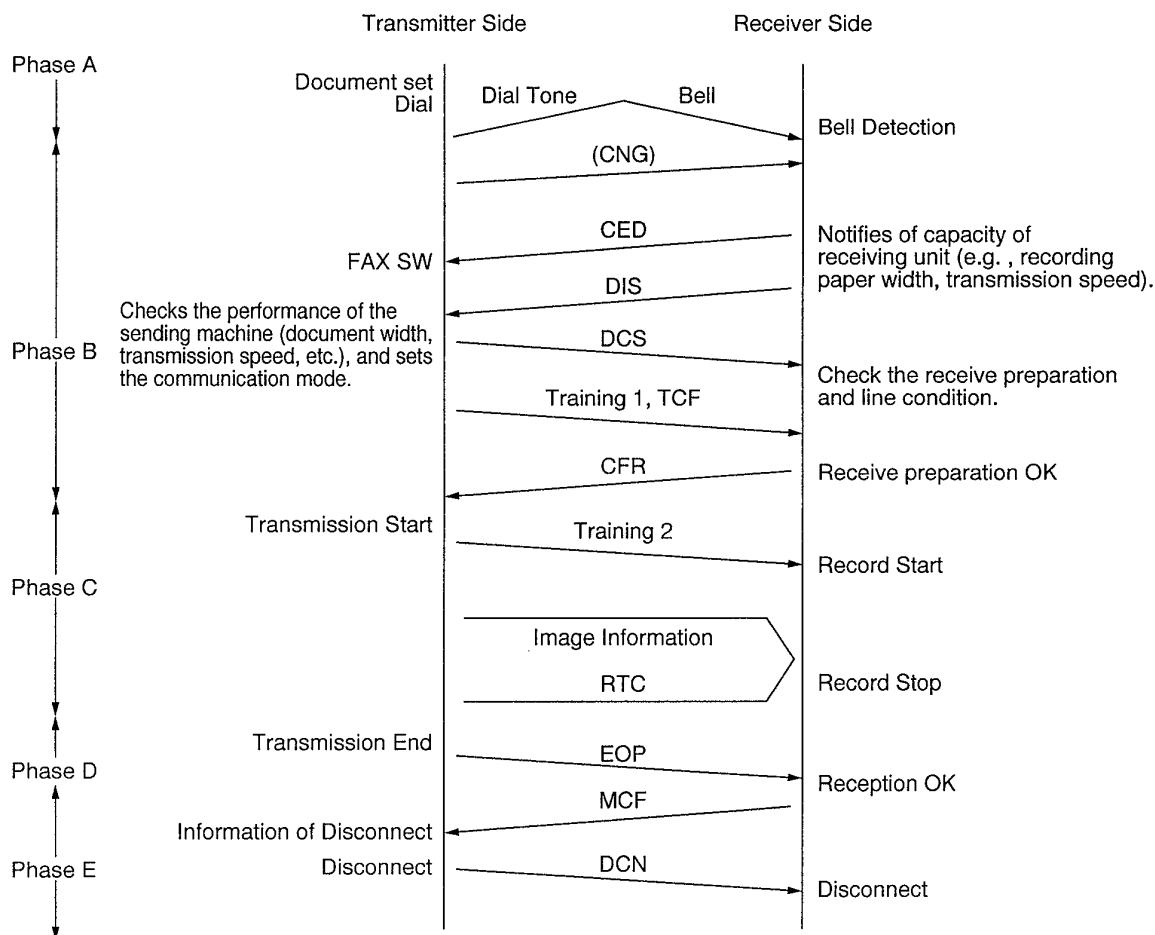
## 6) Explanation of Technology

### (1) G3 Communication Signals (T. 30 Binary Process)

In G3 Facsimile communication, this is the procedure for exchange of control signals between the sending and receiving machines both before and after transception of image signals.

Control signals at 300 bps FSX are: 1850 Hz...0, 1650Hz...1.

An example of binary process in G3 communication is shown below.



### Explanation of Signals

Control signals are comprised mainly of 8-bit identification signals and the data signals added to them. Data signals are added to DIS and DCS signals.

Signal.....DIS (Digital Identification Signal)

Function:

Identification Signal Format.....00000001

Notifies of capacity of receiving unit

The added data signals are as follows.

(Example)

| Bit No. | DIS/DTC                                     | DCS                       |
|---------|---|---------------------------|
| 1       | Transmitter - T. 2 operation                |                           |
| 2       | Receiver - T. 2 operation                   | Receiver - T. 2 operation |
| 3       | T.2 IOC = 176                               | T. 2 IOC = 176            |
| 4       | Transmitter - T. 3 operation                |                           |
| 5       | Receiver - T. 3 operation                   | Receiver - T. 3 operation |
| 6       | Reserved for future T. 3 operation features |                           |

| Bit No.  | DIS/DTC  | DCS  |
|--|--|--|
| 7  | Reserved for future T.3 operation features   |  |
| 8  | Reserved for future T.3 operation features   |  |
| 9  | Transmitter - T.4 operation  |  |
| 10   | Receiver - T.4 operation   | Receiver - T.4 operation   |
| 11, 12<br>(0, 0)<br>(0, 1)<br>(1, 0)<br>(1, 1) | Data signalling rate<br>V.27 ter fallback mode<br>V.27 ter<br>V.29<br>V.27 ter and V.29  | Data signalling rate<br>2400 bit/s V.27 ter<br>4800 bit/s V.27 ter<br>9600 bit/s V.29<br>7200 bit/s V.29   |
| 13   | Reserved for new modulation system   |  |
| 14   | Reserved for new modulation system   |  |
| 15   | Vertical resolution = 7.7 line/mm  | Vertical resolution = 7.7 line/mm  |
| 16   | Two-dimensional coding capability  | Two-dimensional coding   |
| 17, 18<br>(0, 0)<br>(0, 1)<br>(1, 0)<br>(1, 1) | Recording width capabilities<br>1728 picture elements along scan line<br>length of 215 mm $\pm$ 1%<br>1728 picture elements along scan line<br>length of 215 mm $\pm$ 1% and<br>2048 picture elements along scan line<br>length of 255 mm $\pm$ 1% and<br>2432 picture elements along scan line<br>length of 303 mm $\pm$ 1%<br>1728 picture elements along scan line<br>length of 215 mm $\pm$ 1% and<br>2048 picture elements along scan line<br>length of 255 mm $\pm$ 1%<br>Invalid (see Note 7) | Recording width<br>1728 picture elements along scan line<br>length of 215 mm $\pm$ 1%<br>2432 picture elements along scan line<br>length of 303 mm $\pm$ 1% and<br><br>2048 picture elements along scan line<br>length of 255 mm $\pm$ 1% and<br><br>Invalid |
| 19, 20<br>(0, 0)<br>(0, 1)<br>(1, 0)<br>(1, 1) | Maximum recording length capability<br>A4 (297 mm)<br>Unlimited<br>A4 (297 mm) and B4 (364 mm)<br>Invalid  | Maximum recording length<br>A4 (297 mm)<br>Unlimited<br>B4 (364 mm)<br>Invalid   |

Signal.....DCS (Digital Command Signal)

Identification Signal Format.....X1000001

(Example)

Function:

Notifies of capacity of receiving machine obtained at DIS and announces the transmission mode of the sender. The added data signals are as follows.

| Bit No.  | DIS/DTC   | Standard setting | DCS  |
|--|---|------------------|--|
| 21, 22, 23<br>(0, 0, 0)<br>(0, 0, 1)<br>(0, 1, 0)<br>(1, 0, 0)<br>(0, 1, 1)<br>(1, 1, 0)<br>(1, 0, 1)<br>(1, 1, 1) | Minimum scan line time capability at the receiver<br>20 ms at 3.851/mm: T7.7=T3.85<br>40 ms at 3.851/mm: T7.7=T3.85<br>10 ms at 3.851/mm: T7.7=T3.85<br>5 ms at 3.851/mm: T7.7=T3.85<br>10 ms at 3.851/mm: T7.7=1/2 T3.85<br>20 ms at 3.851/mm: T7.7=1/2 T3.85<br>40 ms at 3.851/mm: T7.7=1/2 T3.85<br>0 ms at 3.851/mm: T7.7=T3.85 |                  | Minimum scan line time<br>20 ms<br>40 ms<br>10ms<br>5ms<br><br><br><br>0ms |

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| Bit No.          | DIS/DTC  | Standard setting | DCS   |
|------------------|--|------------------|---|
| 24               | Extend field   | 1                | Extend field  |
| 25               | 2400 bit/s handshaking   | 0                | 2400 bit/s handshaking  |
| 26               | Uncompressed mode  | 0                | Uncompressed mode   |
| 27               | Error correction mode  | 0                | Error correction mode   |
| 28               | Set to "0"   | 0                | Frame size 0 = 256 octets<br>1 = 64 octets  |
| 29               | Error limiting mode  | 0                | Error limiting mode   |
| 30               | Reserved for G4 capability on PSTN   | 0                | Reserved for G4 capability on PSTN  |
| 31               | Unassigned   | 0                |   |
| 32               | Extend field   | 1                | Extend field  |
| 33<br>(0)<br>(1) | Validity of bits 17,18<br>Bits 17,18 are valid<br>Bits 17,18 are invalid                   | 0                | Recording width<br>Recording width indicated by bits 17,18<br>Recording width indicated by this field bit information |
| 34               | Recording width capability 1216 picture elements along scan line length of 151 mm $\pm$ 1% | 0                | Middle 1216 elements of 1728 picture elements   |
| 35               | Recording width capability 864 picture elements along scan line length of 107 mm $\pm$ 1%  | 0                | Middle 864 elements of 1728 picture elements  |
| 36               | Recording width capability 1728 picture elements along scan line length of 151 mm $\pm$ 1% | 0                | Invalid   |
| 37               | Recording width capability 1728 picture elements along scan line length of 107 mm $\pm$ 1% | 0                | Invalid   |
| 38               | Reserved for future recording width capability   | 0                |   |
| 39               | Reserved for future recording width capability   | 0                |   |
| 40               | Extend field   | 1                | Extend field  |
| 41               | Semi super time / mm   | 1                |   |
| 42               | Semi super time / inch   | 0                |   |
| 43               | Super time   | 0                |   |
| 44               | inch   | 0                |   |
| 45               | mm   | 1                |   |
| 46               | MSC/SF   | 0                |   |
| 47               | Select polling   | 0                |   |
| 48               | EXT  | 0                |   |

Note 1 - Standard facsimile units conforming to T.2 must have the following capability : Index of cooperation (IOC)=264.

Note 2 - Standard facsimile units conforming to T.3 must have the following capability : Index of cooperation (IOC)=264.

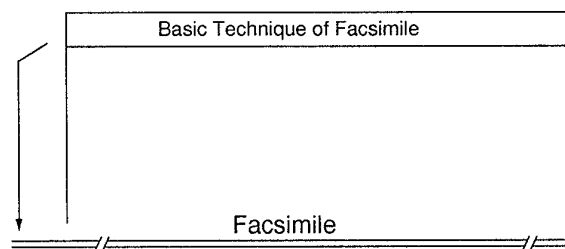
Note 1 - Standard facsimile units conforming to T.4 must have the following capability : Paper length=297 mm.

| Signal                           | Identification Signal Format | Function   |
|----------------------------------|------------------------------|--|
| Training 1                       | _____                        | Fixed pattern is transmitted to receiving side at speed (2400 to 9600 bps) designated by DCS, and the receiving side optimizes the automatic equalizer, etc., according to this signal.  |
| TCF<br>(Training Check)          | _____                        | Sends 0 continuously for 1.5 seconds at the same speed as the training signal.   |
| CFR<br>(Confirmation to Receive) | X0100001                     | Notifies sending side that TCF has been properly received. If TCF is not properly received, FTT (Failure To Train) X0100010 is relayed to sender. Sender then reduces transmission speed by one stage and initiates training once again. |
| Training 2                       | _____                        | Used for reconfirmation of receiving side the same as training 1.  |

| Signal                                 | Identification Signal Format | Function  |
|--|------------------------------|---|
| Image Signal                           | Refer to next page.          |   |
| RTC<br>(Return to Control)             |                              | Sends 12 bit (0...01 × 6 times to receiver at same speed as image signal and notifies of completion of transmission of first sheet.   |
| EOP<br>(End of Procedure)              | X1110100                     | End of one communication  |
| MCF<br>(Message Confirmation)          | X0110001                     | End of 1 page reception   |
| DCN<br>(Disconnect)                    | X1011111                     | Phase E starts.   |
| MPS<br>(Multi-Page Signal)             | X1110010                     | Completion of transmission of 1 page. If there are still more documents to be sent, they are output instead of EOP. After MCF reception, sender transmits image signal of second sheet. |
| PRI-EOP<br>(Procedural Interrupt-EOP)  | X1111100                     | If there is an operator call from the sender, it is output after RTC.   |
| PIP<br>(Procedural Interrupt Positive) | X0110101                     | Output in the case of operator call from receiver.  |

(2) Redundancy Compression Process Coding Mode  
This set uses one-dimensional MH format.

(a) Document



(b) Part of document

(c) Run length and image signals equivalent to (b)



(d) Codification of (c) according to MH formula

00110111101010 011 110101 11 001000 011 101010  
(White 400) (Black 4) (White 15) (Black 2) (White 12) (Black 4) (White 16)

11 0100111 000101 000011 10  
(Black 2) (White 18) (Black 8) (White 13) (Black 3)

| Modified Huffman (MH) Code |                     |                     |
|----------------------------|---------------------|---------------------|
| Run length                 | Code for White Line | Code for Black Line |
| 0                          | 00110101            | 000011011           |
| 1                          | 000111              | 010                 |
| 2                          | 0111                | 11                  |
| 3                          | 1000                | 10                  |
| 4                          | 1011                | 011                 |
| 5                          | 1100                | 0011                |
| 6                          | 1110                | 0010                |
| 7                          | 1111                | 00011               |
| 8                          | 10011               | 000101              |
| 9                          | 10100               | 000100              |
| 10                         | 00111               | 0000100             |
| 11                         | 01000               | 0000101             |
| 12                         | 001000              | 0000111             |
| 13                         | 000011              | 00000100            |
| 14                         | 110100              | 00000111            |
| 15                         | 110101              | 000011000           |
| 16                         | 101010              | 0000010111          |
| 17                         | 101011              | 0000011000          |
| 18                         | 0100111             | 0000001000          |

(c) Total bit number before MH codification (497 bit)  
(d) Total bit number after MH codification (63 bit)

**4-2. MODEM CIRCUIT OPERATION**

The modem (IC5) has all the hardware satisfying the ITU-T standards mentioned previously.

When the gate array IC4 (73) is brought to low level, the modem (IC5) is chip-selected and resistors inside IC are selected by select signals from CPU (IC1) A0-A4, commands are written through data bus, and all processing is controlled at the CPU (IC1) according to ITU-T procedures. Here the signal INT dispatched from IRQ (pin 52 of IC5) to the CPU (IC1) and gate array IC4 is output when preparation for acceptance of transmission data is OK and when demodulation of reception data is complete; the CPU (IC1) implements post processing.

This modem (IC5) has an automatic application equalizer. With training signal 1 or 2 at time of G3 reception, it can automatically establish the optimum equalizer. Also, the modem (IC5) generates an internal clock of 24.00014 MHz by means of an external crystal oscillator (X1).

**1) Facsimile Transmission/DTMF Line Send / Beep Line Send**

The digital image data on the data bus is modulated in the modem (IC5), and sent from pin 44 via amplifier IC13 (6→7), the NCU section to the telephone line.

IC5(44) → C508 → R502 → IC13(6 → 7) → CN1(1) → C234 → R274 → NCU Section [R120 → C120 → IC102 (6 → 7) → R102 → R101 → T1] → TEL. Line.

**2) Facsimile Reception**

The analog image data which is received from the telephone line passes through the NCU section and enters pin 45 of the modem (IC5). The signals that enter pin 45 of the modem (IC5) are demodulated in the board to digital image signals, then placed on the data bus.

In this case, the image signals from the telephone line are transmitted serially. Hence they are placed on the bus in 8 bit units. Here, internal the equalizer circuit reduces the image signals to the long-distance receiving level.

It is designed to correct the characteristics of the frequency band centered about 3 KHz and maintain a constant receiving sensitivity.

It can be set in the service mode.

TEL. Line → NCU Section → CN1(2) → C521 → R509 → IC13(2 → 1) → C519 → R507 → IC5(45)

**3) DTMF Transmission (Monitor tone)**

The DTMF signal generated in the modem (IC5) is output from pin 44, then passes through the analog switch IC112 pins (11-3), and the NCU section to the telephone line as same as facsimile transmission signals.

**(DTMF Monitor Tone)**

IC5(44) → C508 → R502 → IC13 (6 → 7) → CN1 (1) → C236 → C278 → R258 → IC112 (11 → 13) → R196 → C181 → IC111 (4) → IC111 (8, 5) → Speaker

**4) Call Tone Transmission**

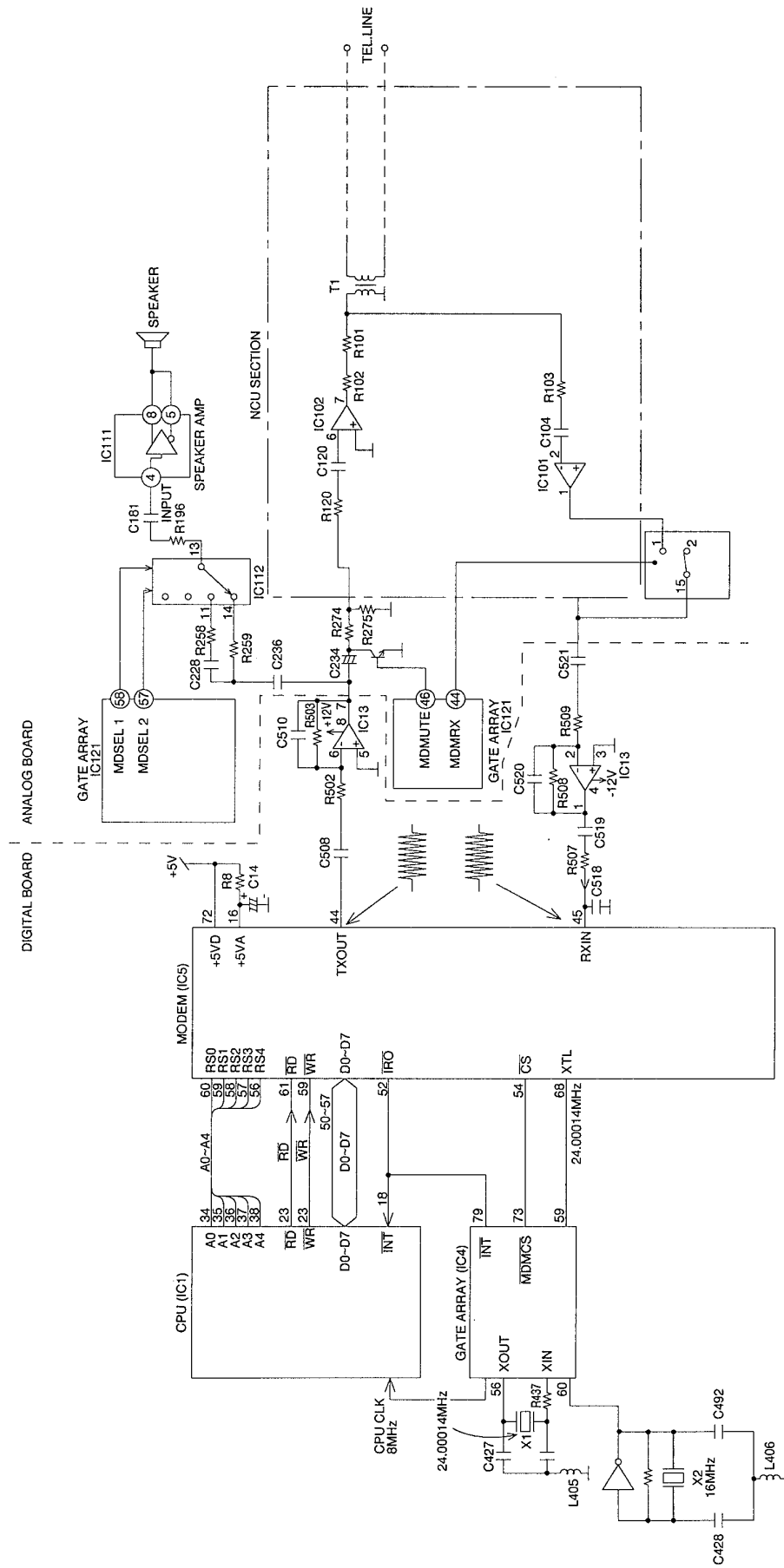
The call signal which is generated in the modem (IC5) passes through analog switch IC112 (14 → 13) and IC111 (4 → 8, 5) to the speaker.

IC5 (44) → C508 → R502 → IC13 (6 → 7) → CN1 (1) → C236 → R259 → IC112 (14 → 13) → R196 → C181 → IC111 (4) → IC111 (8, 5) → Speaker

**5) Busy/Dial Tone Detection**

The path is the same as for FAX receiving. When it is detected, the carrier detect bit of the resistor in the modem (IC5) becomes 1, and this status is monitored by CPU (IC1).

### Circuit Diagram



## 7. ITS (Integrated Telephone System) AND MONITOR SECTIONS

### 7-1. GENERAL

The general ITS operation is executed by the special IC109. This IC has a speakerphone circuit and a handset circuit in 1 chip, and control to each mode is executed from the outside (IC121). At the time of speakerphone operation, the speaker output passes through the power amplifier of the special Power Amp IC (IC111). The DTMF signal, the line transmission beep, and the bell tone are output from the modem (IC5) and distributed by the analog switch (IC112). The alarm tone, the key tone, and the beep are output from the gate array IC4. At the time of pulse dial operation, the monitor tone is output from the gate array IC121.

### 7-2. SPEAKERPHONE CIRCUIT

#### 1) Function

This circuit controls the automatic switching of the transmitted and received signals, to and from the telephone line, when the unit is used in the hands-free mode.

#### 2) Circuit Operation

The speakerphone can only provide a one-way communication path.

In other words, it can either transmit an outgoing signal or receive an incoming signal at a given time, but cannot do both simultaneously. Therefore, a switching circuit is necessary to control the flow of the outgoing and incoming signals.

This switching circuit is contained in IC109 and consists of voice detector, TX attenuator, RX attenuator, comparator, and attenuator control. The circuit analyzes whether the TX (transmit) or the RX (receiver) signal is louder, and then it processes the signals such that the louder signal is given precedence.

The voice detector provides a DC input to the attenuator control corresponding to the TX signal. The comparator receives a TX and RX signals, and supplies a DC input to the attenuator control corresponding to the RX signal.

The attenuator control provides a control signal to the TX and the RX attenuator to switch the appropriate signals ON and OFF. The attenuator control also detects the level of the volume control to automatically adjust for changing ambient conditions.

#### (Transmission Signal Path)

The input signal from the microphone is sent through the circuit via the following path:

MIC → C145 → R277 → IC109 [(13) → MIC AMP → SW4 → TX ATT → (27)] → R282 → C124 → R130 → IC102 (2)(1) → R117 → C117 → NCU Section [IC102 (6)(7)] → Telephone Line.

#### (Reception Signal Path)

Signals received from the telephone line are outputted at the speaker via the following path:

Telephone Line → NCU Section [IC101 (2)(1)] → R126 → Q102 → C144 → R151 → IC109 [(22) → SW3 → RX ATT → (30)] → C157 → IC109 [(4) → SW5 → SP AMP → (7)] → C178 → R193 → IC111 → SP

#### (Control Signal Path)

Control signals for transmission and reception are inputted to IC109 via following path:

(Transmission Control Signal Path)

MIC → C145 → R277 → IC109 [(13) → MIC AMP → SW4 → (31)] → C155 → R167 → IC109 [(1) → AMP → Comparator]

(Reception Control Signal Path)

Telephone Line → NCU Section [IC101 (2)(1)] → R126 → Q102 → C144 → R151 → IC109 [(22) → SW3 → RX ATT → (30)] → C157 → IC109 [(4) → SW5 → SP AMP → (7)] → C152 → R168 → IC109 [(3) → AMP → Comparator]

#### (Voice Detector)

The transmission signal given as input from the microphone to IC109 pin (1) passes through the built-in amplifier and enters the voice detection circuit for judgment of voice noise. In case of noise, the TX attenuator is made effective via the attenuator control.

#### (Attenuator Control)

The attenuator control detects the setting of the volume control through pin 11 of IC109 to automatically adjust for changing ambient conditions.

### 7-3. HANDSET CIRCUIT

#### 1) Transmission Signal

Handset MIC → R88 → C80 → IC4 (16)(4) → R75 → RLY1-2 (B → C) → Q2 → TEL LINE

#### 2) Reception Signal

TEL LINE → Q1 → RLY1-2 (C → B) → F75 → R80 → R81 → C62 → R84 → C71 → R93 → IC4 (12)(9) → C68 → R95 → Handset Speaker



## 7-4. MONITOR CIRCUIT

### 1) DTMF Monitor

#### (Speaker operation)

CN1 (1) → C236 → C228 → R258 → IC112 (11)(13) → R196 → C181 → IC111 (4) → (5)(8) → Speaker

#### (Handset operation) DTMF monitor

Power ON:

CN1 (1) → C234 → R274 → R120 → C120 → NCU [IC102 (6)(7)] → T1 → RLY2 → R58 → R61 → C49 → R70 → IC4 (10)(9) → Handset speaker

Power failure:

IC3 (18) → C41 → R41 → R45 → C45 → R70 → IC4 (10)(9) → Handset speaker

### 2) DTMF Signal for Line Transmission

CN1 (1) → C234 → R274 → R120 → C120 → NCU [IC102 (6)(7)] → TEL Line

When handset is OFF-HOOK, NCU [IC102 (6)(7)] → T1 → RLY2 → IC4 (14)(4) → TEL Line

When handset is OFF-HOOK and Power down → IC3 (18) → C41 → R40 → R44 → R46 → C46 → IC4 (14)(4) → TEL Line

### 3) Ring Tone

#### (Modem output...EXT. TAM, FAX, TEL MODE)

CN1 (1) → C236 → R259 → IC112 (14)(13) → R196 → C181 → IC111 [(4) → (5)(8)] → Speaker

#### (Gate Array output...TEL/FAX MODE)

CN2 (9) → R262 → R256 → IC112 (12)(13) → R196 → C181 → IC111 [(4) → (5)(8)] → Speaker

### 4) Alarm/Beep, Keytone

CN2 (10) → R263 → C238 → R257 → IC112 (15)(13) → R196 → C181 → IC111 [(4) → (5)(8)] → Speaker

### 5) Dummy ring back tone for Line Transmission

IC4 (44) → Q2(B) → (C) → CN2 (8) → R125 → R122 → R121 → R119 → C119 → NCU [IC102 (6)(7)] → Telephone Line

IC4 (42) → R440

Digital Board

IC109 Control Table

|                   |                   | IC109 Input Logic |       |       | IC109 Internal Switch |     |     |     |     |
|-------------------|-------------------|-------------------|-------|-------|-----------------------|-----|-----|-----|-----|
|                   |                   | S/H               | RMUTE | TMUTE | SW1                   | SW2 | SW3 | SW4 | SW5 |
| Speakerphone Mode | Communication     | 1                 | 0     | 0     | ×                     | ×   | ○   | ○   | ○   |
|                   | Transmission Mute | 1                 | 0     | 1     | ×                     | ×   | ○   | ×   | ○   |
|                   | Dial              | 1                 | 1     | 1     | ×                     | ×   | ×   | ×   | ○   |
| Other             |                   | 0                 | 1     | —     | ×                     | ×   | ×   | ×   | ×   |

0: Low Level(0V)

1: High Level(5V)

O: ON

X: OFF

**Monitor Tone Control Table**

|                      |           | S/H | RMU | TMU | SP<br>MUTE | MD<br>SEL1 | MD<br>SEL0 | K. T/<br>ALM | DR<br>SPH/L | BREAK | MODEM<br>TX | TONE<br>1 | TONE<br>2 | DRING |
|----------------------|-----------|-----|-----|-----|------------|------------|------------|--------------|-------------|-------|-------------|-----------|-----------|-------|
| Bell<br>Ringing      | Modem out | 0   | 1   | 1   | 0          | 0          | 1          | 0            | —           | 1     | ○           |           |           |       |
|                      | G/A out H | 0   | 1   | 1   | 0          | 0          | 0          | 0            | 0           | 0     |             |           | ○         |       |
|                      | L         | 0   | 1   | 1   | 0          | 0          | 0          | 0            | 1           | 0     |             |           | ○         |       |
| Handset Tone Dial    |           | 0   | 1   | 1   | 1          | 1          | 1          | 0            | —           | 0     | ○           |           |           |       |
| SP-Phone Tone Dial   |           | 1   | 1   | 1   | 0          | 1          | 1          | 0            | —           | 0     | ○           |           |           |       |
| Handset Pulse Dial   |           | 0   | 1   | 1   | 1          | 0          | 0          | 0            | —           | 1/0   |             |           |           |       |
| SP-Phone Pulse Dial  |           | 1   | 1   | 1   | 0          | 0          | 0          | 0            | —           | 1/0   |             |           |           |       |
| Alarm Ringing        |           | 0   | 1   | —   | 0          | 1          | 0          | 0            | —           | —     |             | ○         |           |       |
| Beep Ringing         |           | 0   | 1   | —   | 0          | 1          | 0          | 1            | —           | —     |             | ○         |           |       |
| Dummy Ring Back Tone |           | 0   | 1   | 1   | 0          | 0          | 0          | 0            | —           | 0     |             |           |           | ○     |

## 7-5. ELECTRONIC VOLUME

Speakerphone volume and ringer volume can be switched with the volume key on the Operation Panel.

SP Phone RX...Low ←→ High (8 step)

Switch analog SW IC110 ON/OFF. Concerning control please refer to the table.

Ringer Vol.

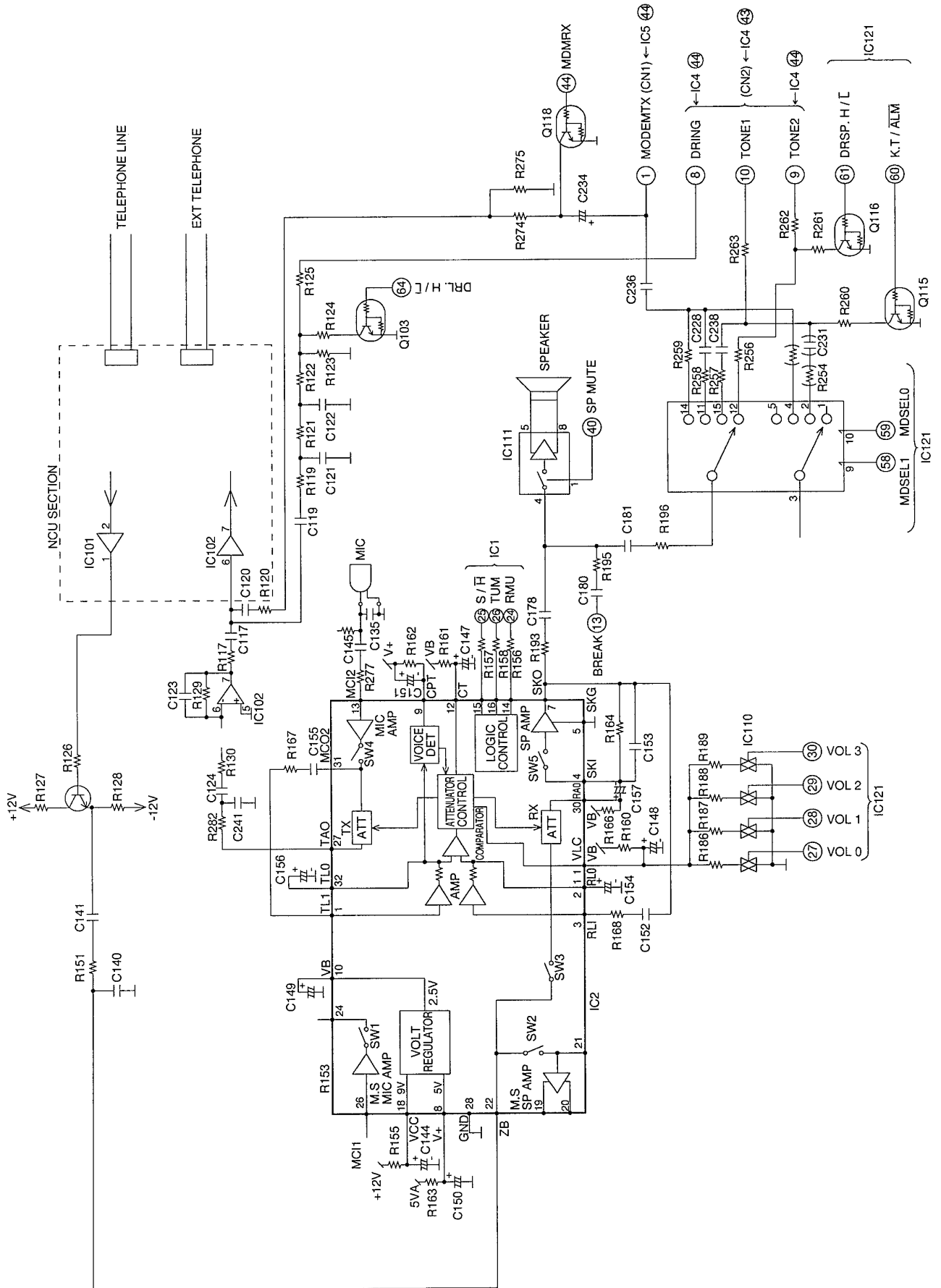
i) Modem output.....Modem output is switched with software's control.

ii) Gate Array output.....Monitor Circuit. (Please refer to 129.)

**Electronic Volume Control Table**

|          |   |   | VOL1 | VOL2 | VOL3 | VOL4 |
|----------|---|---|------|------|------|------|
| SP-Phone | <div> <div>Loud</div> <div>↑</div> <div>↓</div> <div>Quiet</div> </div> | 8 | 0    | 0    | 0    | 0    |
|          |   | 7 | 1    | 0    | 0    | 0    |
|          |   | 6 | 0    | 1    | 0    | 0    |
|          |   | 5 | 1    | 1    | 0    | 0    |
|          |   | 4 | 0    | 1    | 1    | 0    |
|          |   | 3 | 1    | 1    | 1    | 0    |
|          |   | 2 | 0    | 1    | 0    | 1    |
|          |   | 1 | 1    | 0    | 1    | 1    |

Circuit Diagram



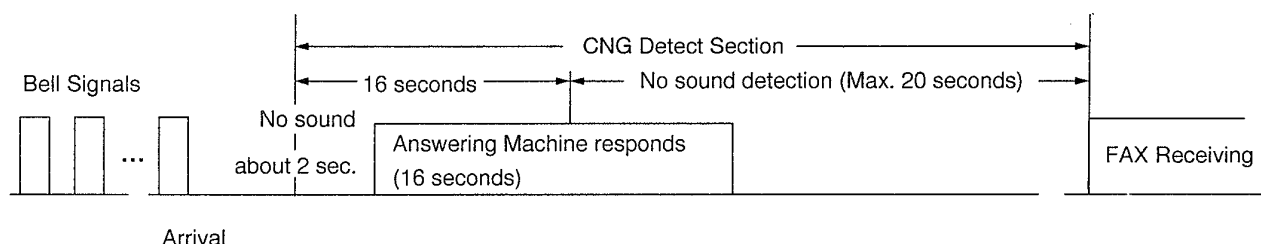
## 8. TAM INTERFACE SECTION

### 8-1. FUNCTION

In case that EXT. TAM position is selected in Receive mode, the unit receives documents for FAX call or the external TAM records a voice message automatically.

To switch between answering machine and facsimile in EXT. TAM Mode.

|  | OPERATION   | EXPLANATION   |
|--|---|---|
|  | When bell signal rings as many as the numbers which installed in the connected answering machine, the answering machine seizes the line, then answering message is out to the line. | The length of response messages are 16 seconds.<br>While response message is being played, the unit starts to detect CNG signal.<br>When CNG signal is received, the unit switches to FAX receiving.  |
|  | 16 seconds after the answering machine gets the telephone call, no-sound detection begins.  | When there is approximately 4 seconds' no sound situation for 20 seconds after being passed 16 seconds, the unit switches to FAX receiving. During this period it detects CNG signal also.<br>When it cannot detect no-sound nor CNG, it doesn't switch to FAX receiving, the unit doesn't catch the line.<br>(The answering system hangs up the line.) |



**Attention 1:** No sound detection lasts 20 seconds after the telephone call coming in to the answering machine. If there is no sound situation for more than 4 seconds it is switched to the facsimile.

**Attention 2:** When answering machine can't catch the telephone call because of the disconnection or no capacity in the tape, the unit catches the call after 5 times' bell ring, then switches to facsimile. When you install in user, it is possible for the unit not to catch phone calls.

## 8-2. CIRCUIT OPERATION

TAM INTERFACE circuit consists of EXT. TAM HOOK detection circuit, CNG signal from the party's detection circuit, VOX detection circuit (to judge sound/no-sound) and RLY1 (to separate EXT. TAM).

### 1) EXT. TAM HOOK detection circuit

The bell comes to EXT. TAM and EXT. TAM seizes the line, causing to make DC LOOP. IC1 detects this loop current. During detection IC1 (5) or (6) becomes low.

(DC LOOP)

a → L5 → EXT TEL (a') → (EXT.TAM) → EXT TEL (b') → R27 → J17 → RLY1 (B→C) → IC1 (2 → 1) → R2 → L6 → POS1 → b

### 2) CNG signal detection circuit

CNG signal from the party's FAX is detected in MODEM IC5 (digital board).

(Signal path)

Telephone Line → RLY1 → C11 → T2 → IC107 (14)(12) → C232 → R265 → IC108 (2)(1) → IC107 (2)(15) → CN1 (2)

excepting: → C232 → R265 →

↓  
→ C131 → R145 →

### 3) VOX

VOX circuit detects if there is a signal or voice in the line. That's why VOX circuit reacts to OGM of EXT.TAM and ICM from the party.

(Signal path)

Telephone Line → RLY1 → C11 → T2 → IC107 (14)(12) → C232 → R265 → IC108 (2)(1) → IC107 (2)(15) → R183 → C133  
→ IC107 (3)(4) → IC113 (16) [comparator] (2) → IC121 (34)

EXT.TEL Line → R27 →

### 4) RLY 1

Normally this relay switches to the external telephone side (break) and it switches to the open side (make) when the set changes to facsimile communication from EXT.TAM operation.

IC121 (48) High Level → Q104 (ON) → RLY1 (make)

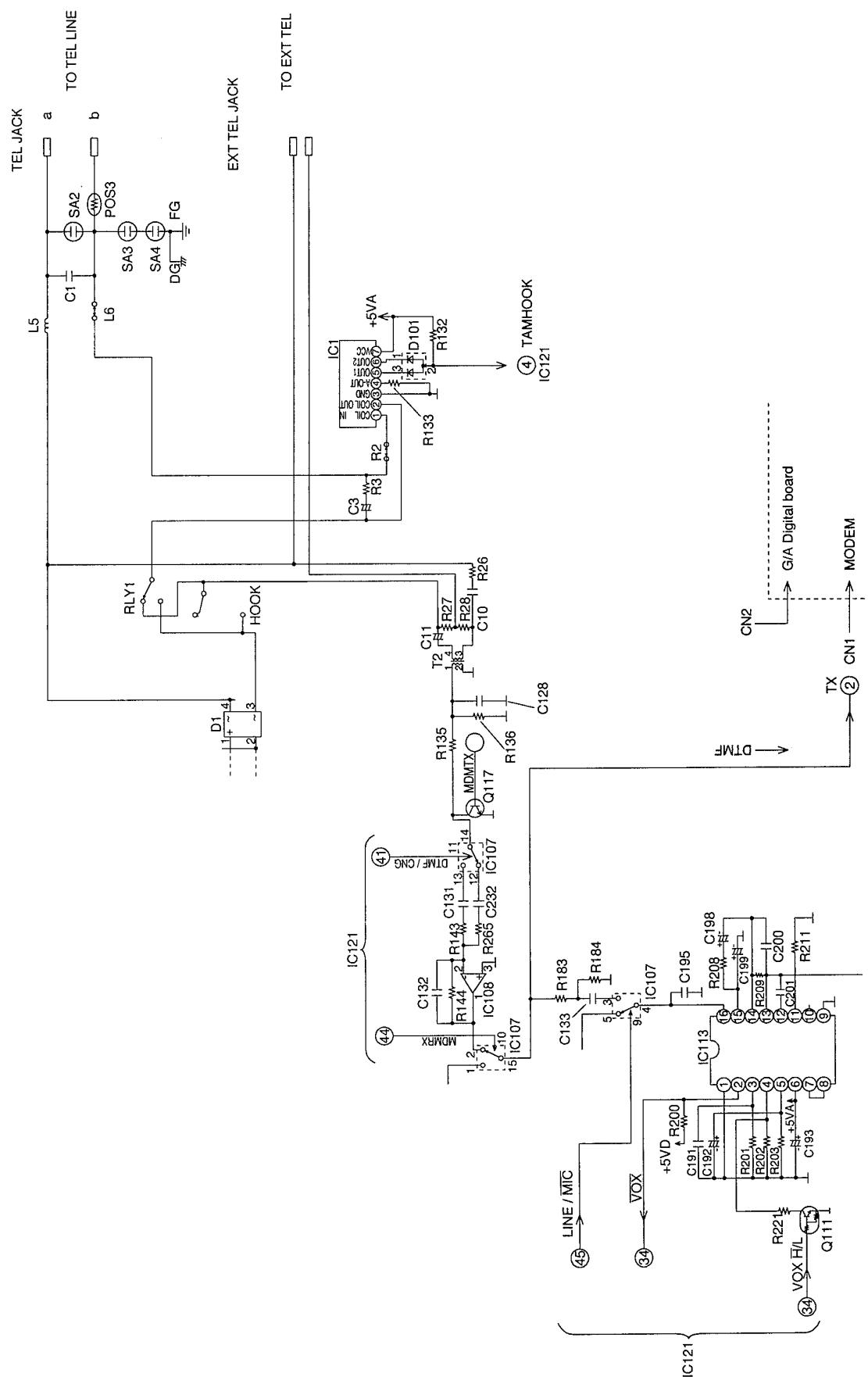
### 5) Remote receiving

This is the DTMF signal of EXT.TEL between a and b. When the party is FAX, this turns unit to FAX receiving.

(Signal Path)

To detect DTMF signal in MODEM.

### Circuit Diagram

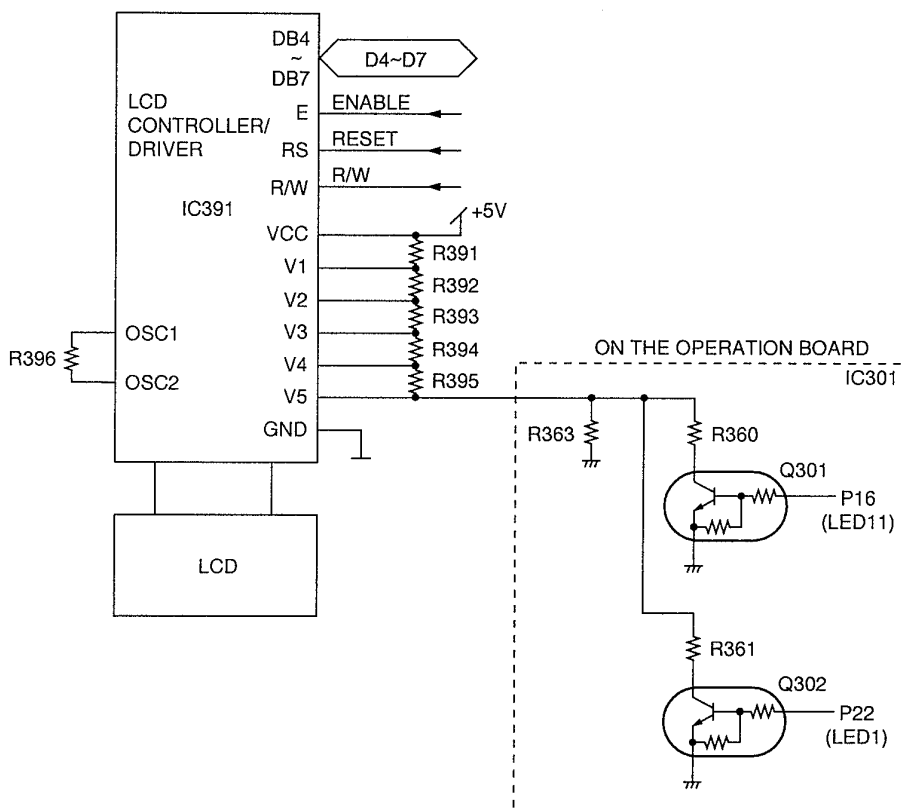


## 10 LCD CONTROLLER (IC391)

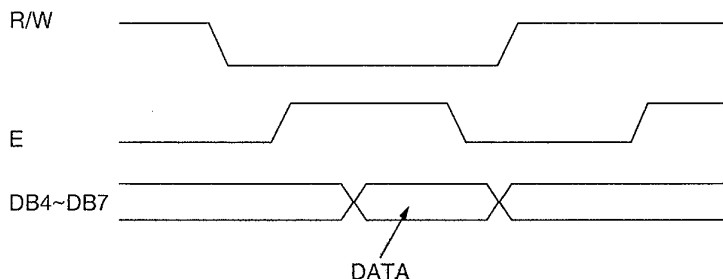
This IC is a chip with LCD controller and driver built in. The Gate Array (IC301) needs only write ASCII code from the data bus (D4~D7). V1 through V5 are power supplies for crystal drive. R360, R361, R363 are density control resistors and R396 is an externally applied resistance for internal oscillation circuit.

Consequently, in this set the timing (mainly positive clock) is generated by the LCD interface circuitry of the gate array (IC301).

**Circuit Diagram**



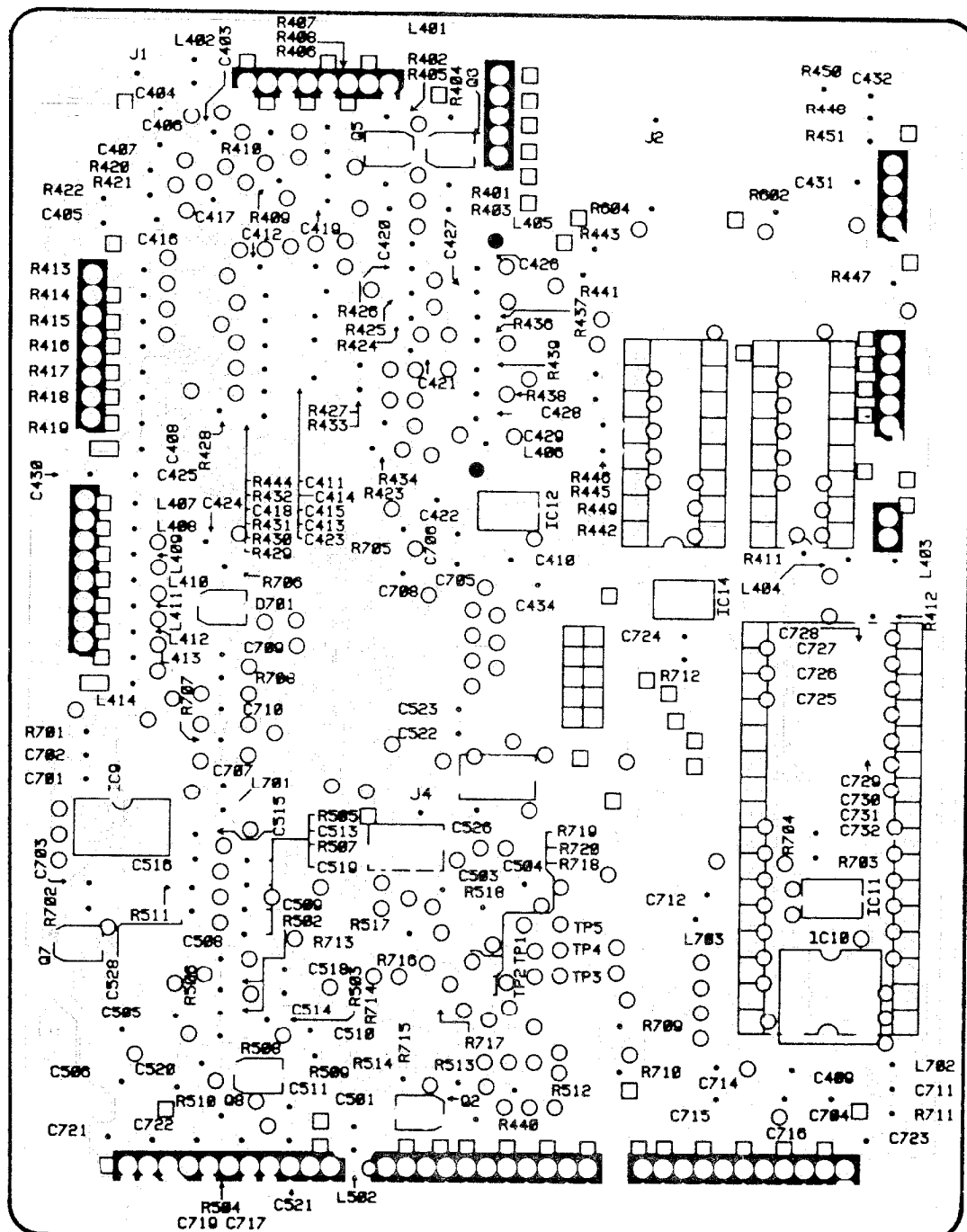
**Timing Chart**




| Density | Light(2) | Normal(1) | Dark(3) | Service Mode<br>565 (1, 2, 3) |
|---------|----------|-----------|---------|-------------------------------|
| P16     | L        | H         | H       |                               |
| P22     | L        | L         | H       |                               |

## PRINTED CIRCUIT BOARD (DIGITAL BOARD)


(BOTTOM VIEW)



**Notes:**

1. The circuit shown in  on the conductor indicates printed circuit on the front side of the printed circuit board.

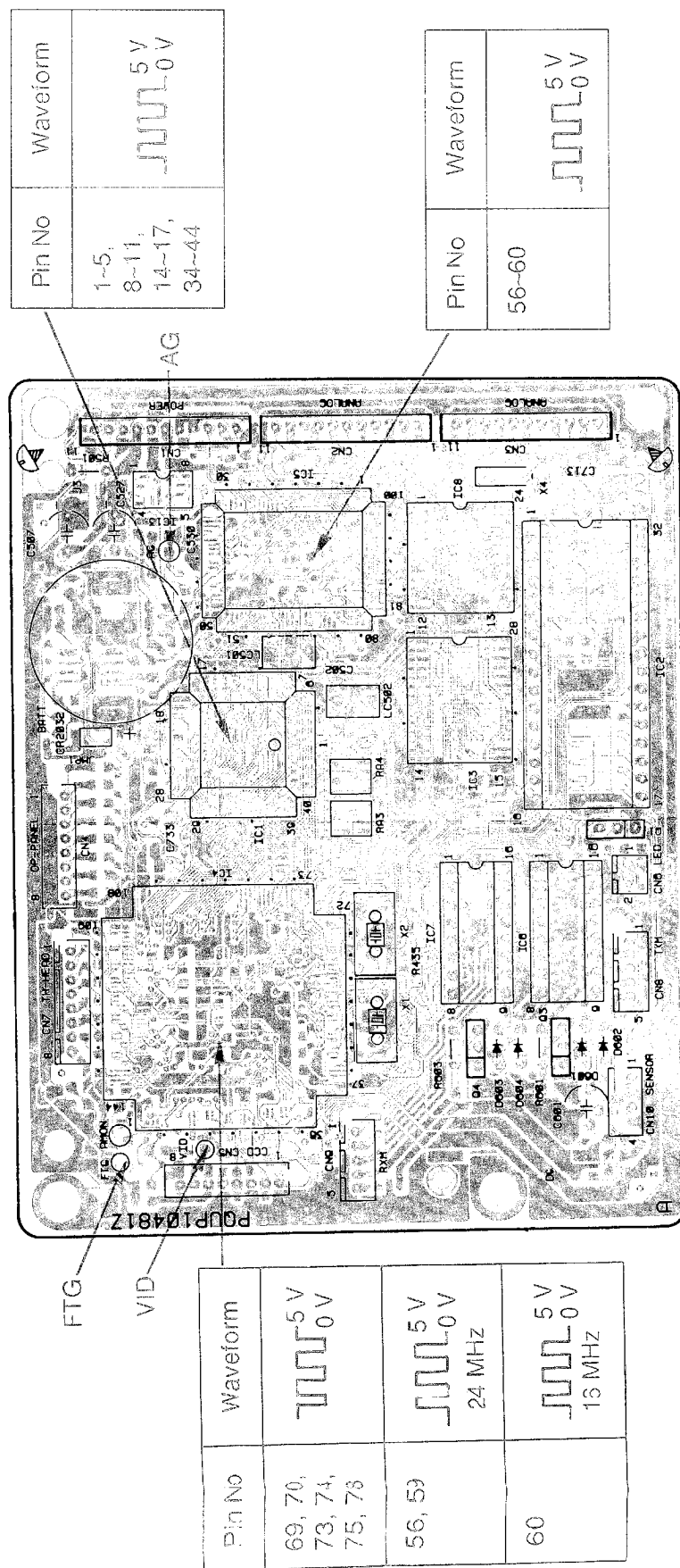
**Notes:**

- Notes:
1. The circuit shown in  on the conductor indicates printed circuit on the back side of the printed circuit board.



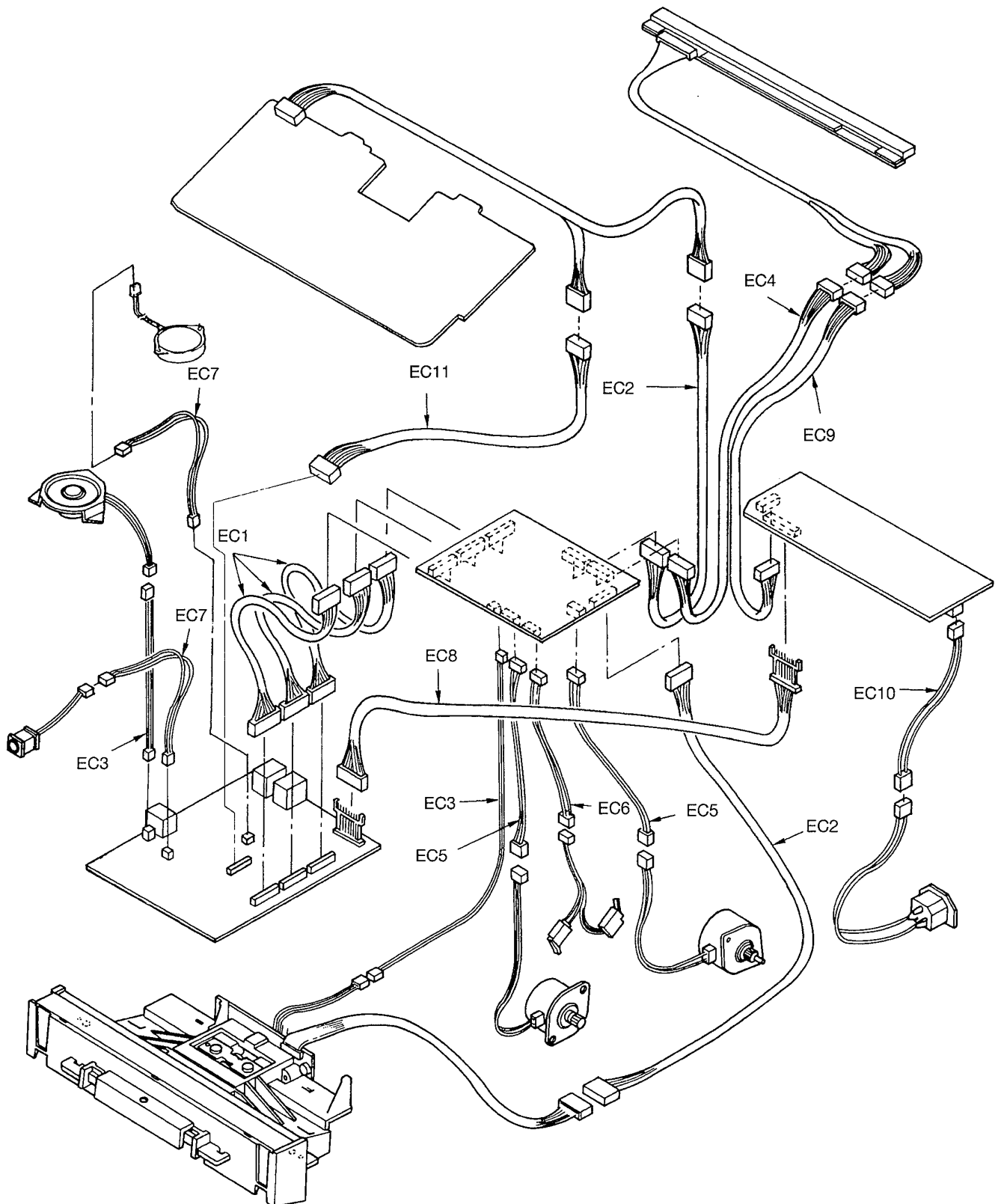
PRINTED CIRCUIT DIAGRAM (DIGITAL BOARD)

(COMPONENT VIEW)



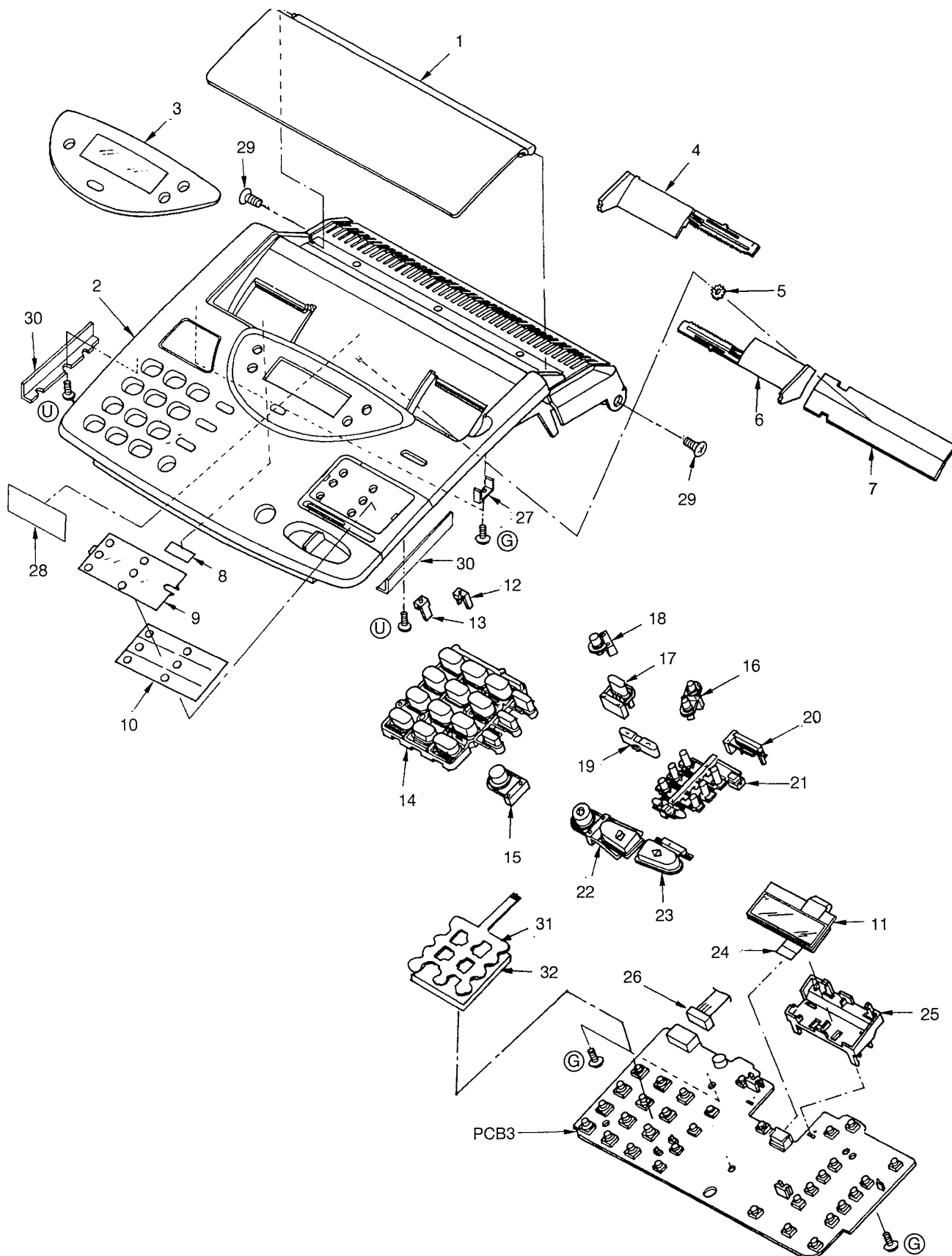
Notes:  
 1. The circuit shown in on the conductor indicates printed circuit on the back side of the printed circuit board.  
 143

# TOOLS

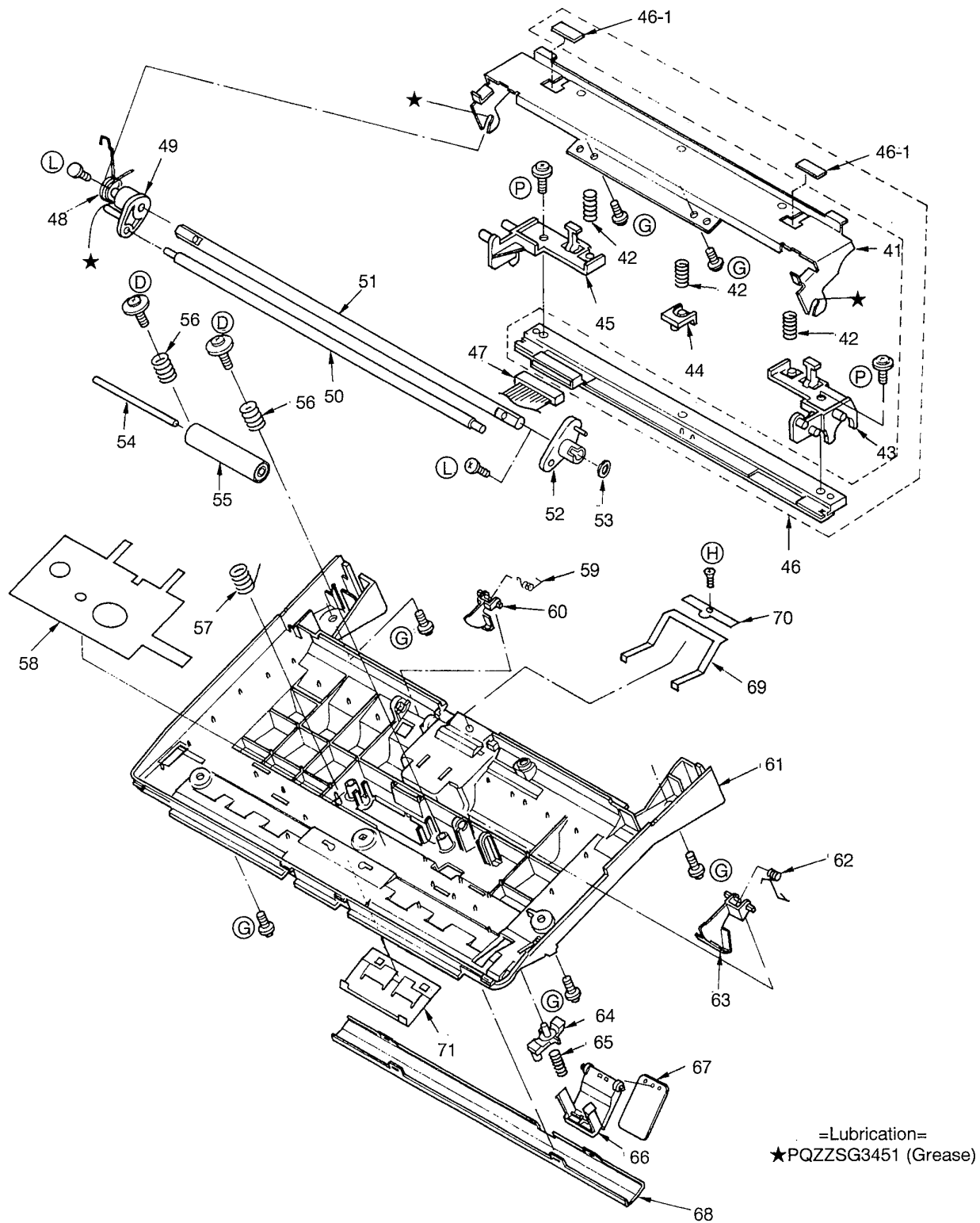


## CABINET, MECHANICAL AND ELECTRICAL PARTS LOCATION

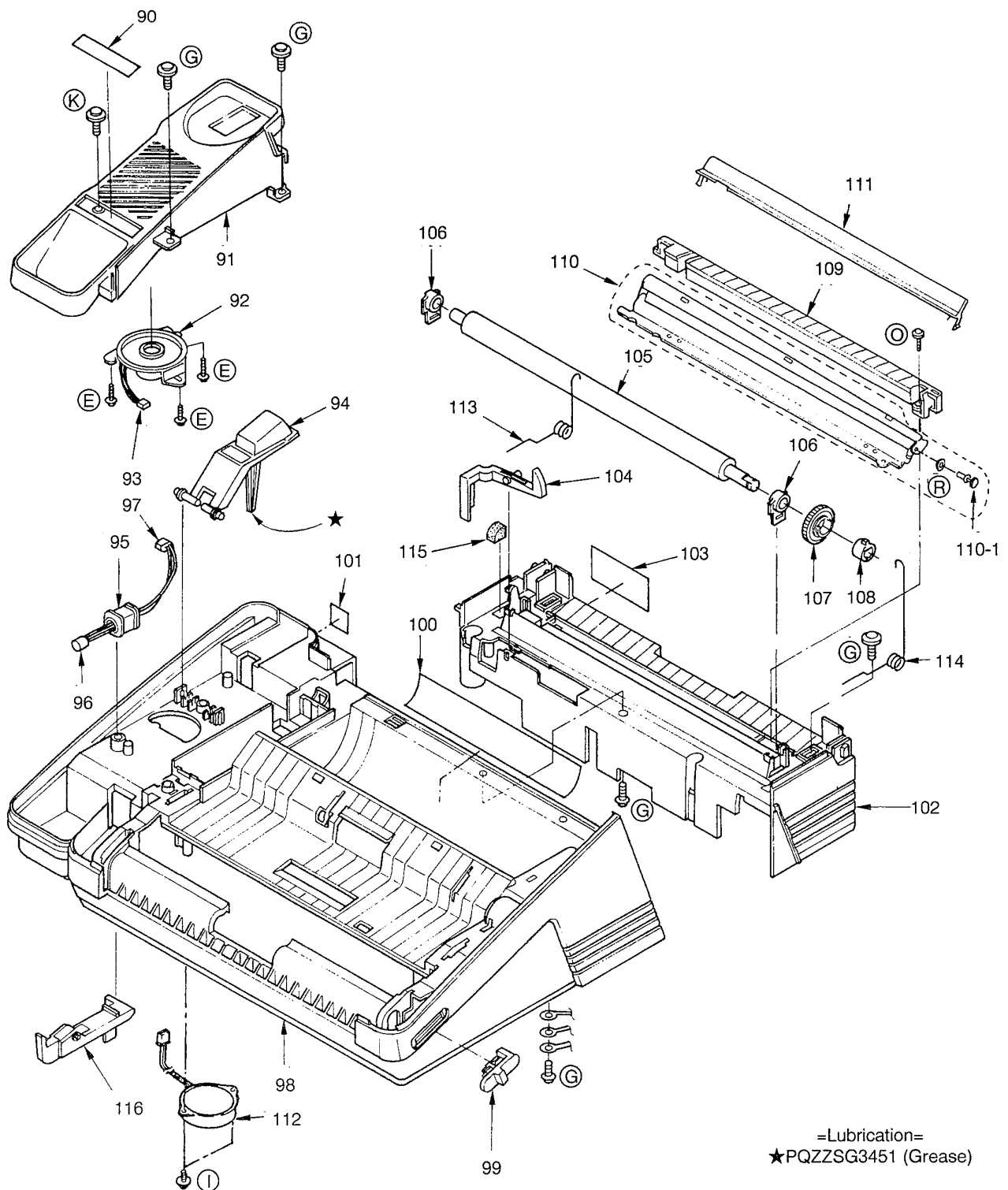
### 1. OPERATION PANEL SECTION



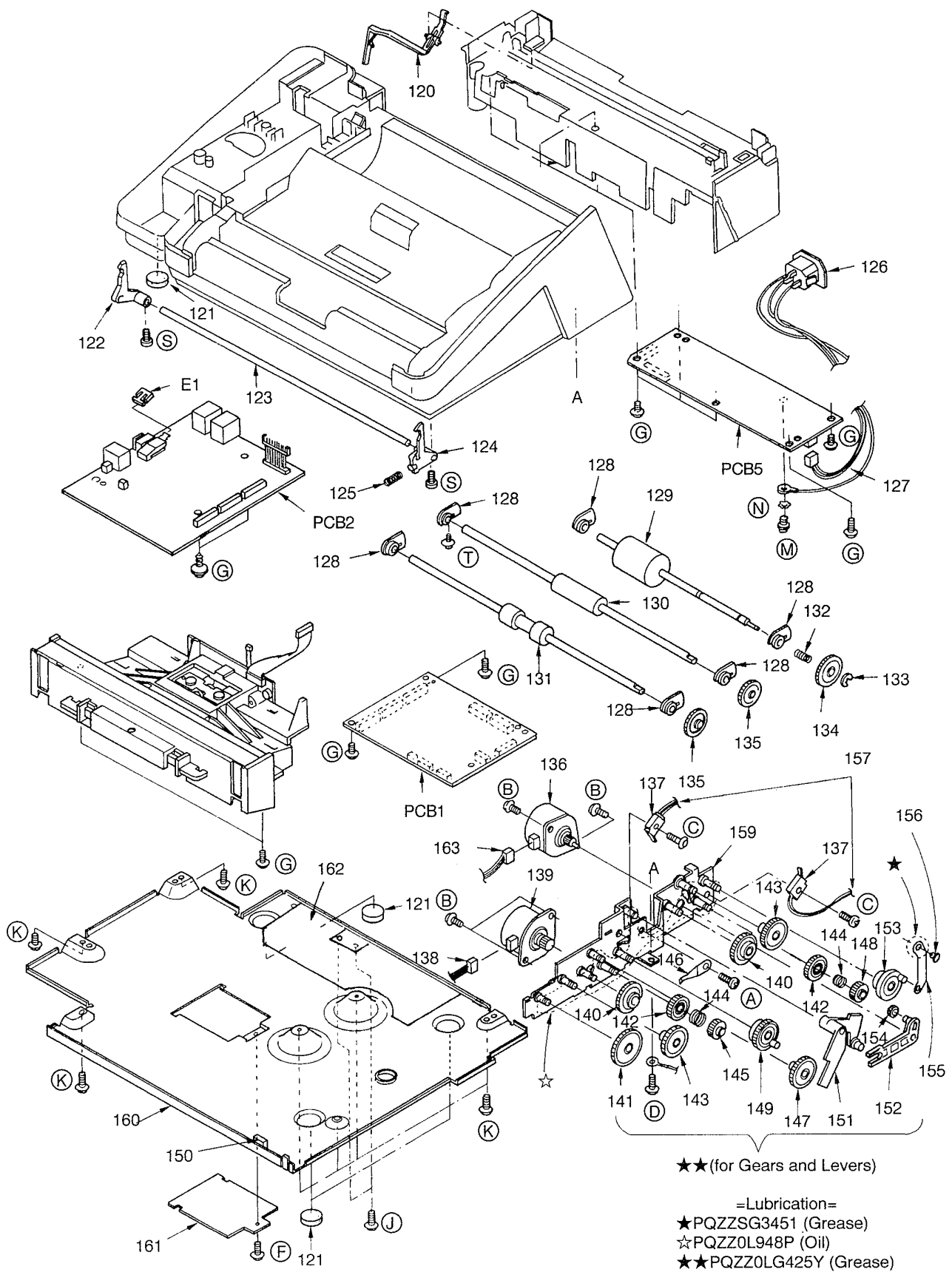
## 2. THERMAL HEAD SECTION



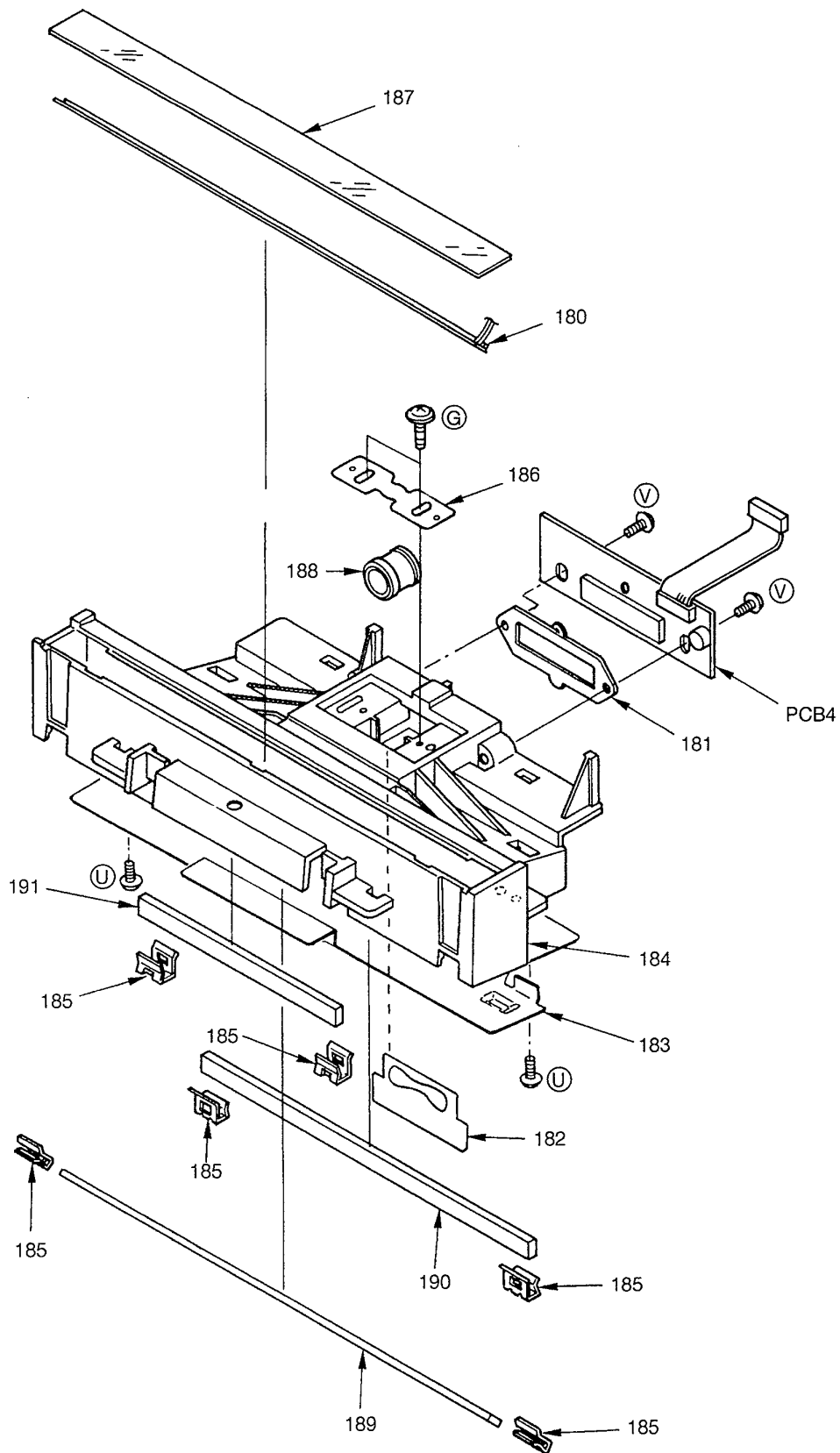
### 3. UPPER BODY SECTION























# 4. LOWER BODY SECTION



5. CCD UNIT SECTION



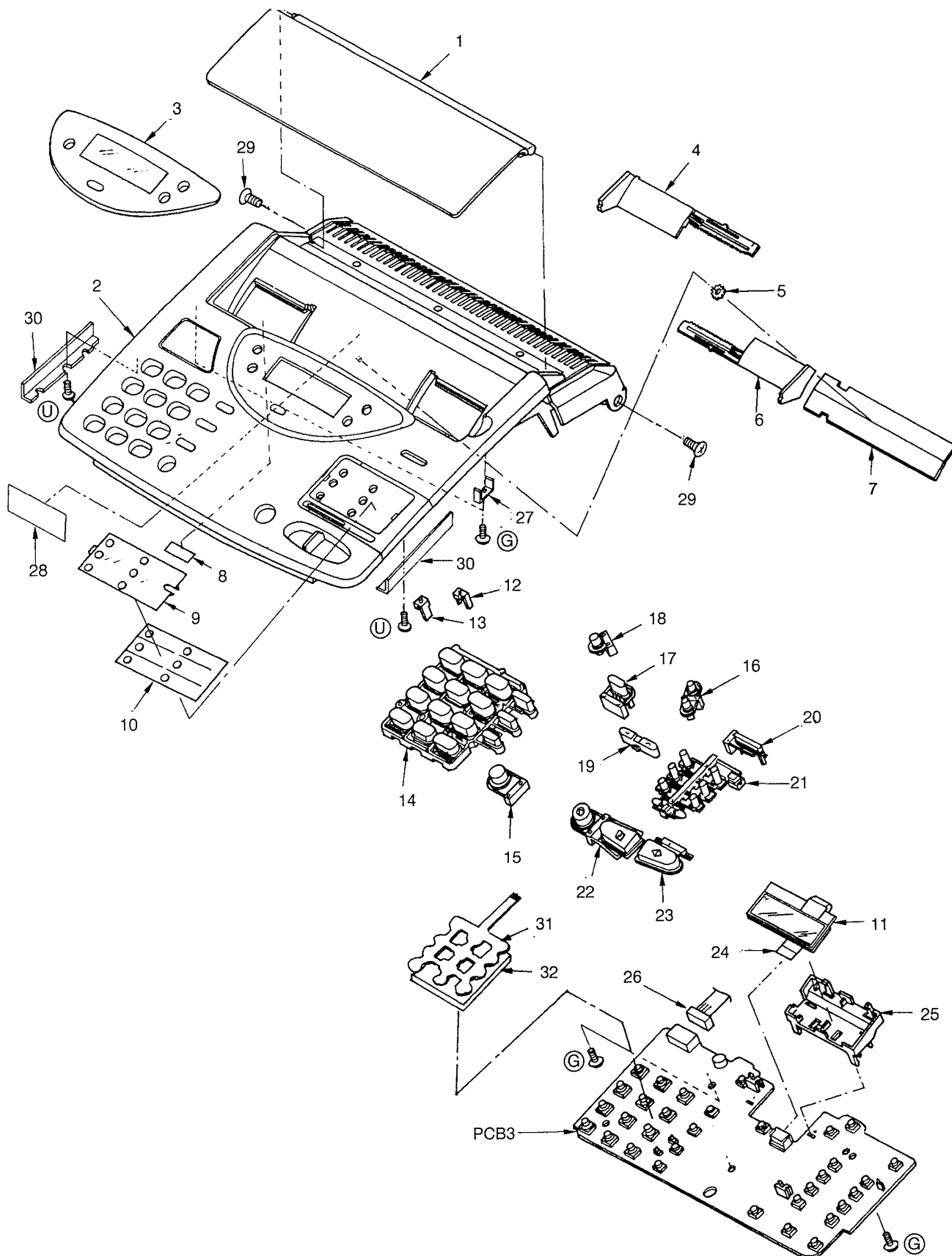
## 6. ACTUAL SIZE SCREWS AND WASHER

| Ref. No. | Part No.  | Figure  | Ref. No. | Part No.  | Figure  |
|----------|-----------|---|----------|-----------|---|
| Ⓐ        | XTT3+5F   |    | Ⓜ        | XSB4+6    |    |
| Ⓑ        | XYC3+CF6  |    | Ⓝ        | XWC4B     |    |
| Ⓒ        | XYN2+C8   |    | ⓪        | XYN3+CF14 |    |
| Ⓓ        | XTW3+W10P |    | Ⓟ        | XYC3+FF8C |    |
| Ⓔ        | XTW3+S8M  |    | Ⓠ        | Not Used  |   |
| Ⓕ        | XTW3+U6L  |    | Ⓡ        | XWG2C6VW  | ⓪   |
| Ⓖ        | XTW3+S10P |    | Ⓢ        | XTW26+5LF |    |
| Ⓗ        | XTS26+8G  |    | Ⓣ        | PJHE5065Z |    |
| Ⓘ        | XTW26+8F  |  | Ⓤ        | XTB3+8G   |  |
| Ⓙ        | XSN3+W6FZ |  | Ⓥ        | XYN3+F16  |  |
| Ⓚ        | XTW3+S12P |  |          |           |   |
| Ⓛ        | XST26+5   |  |          |           |   |

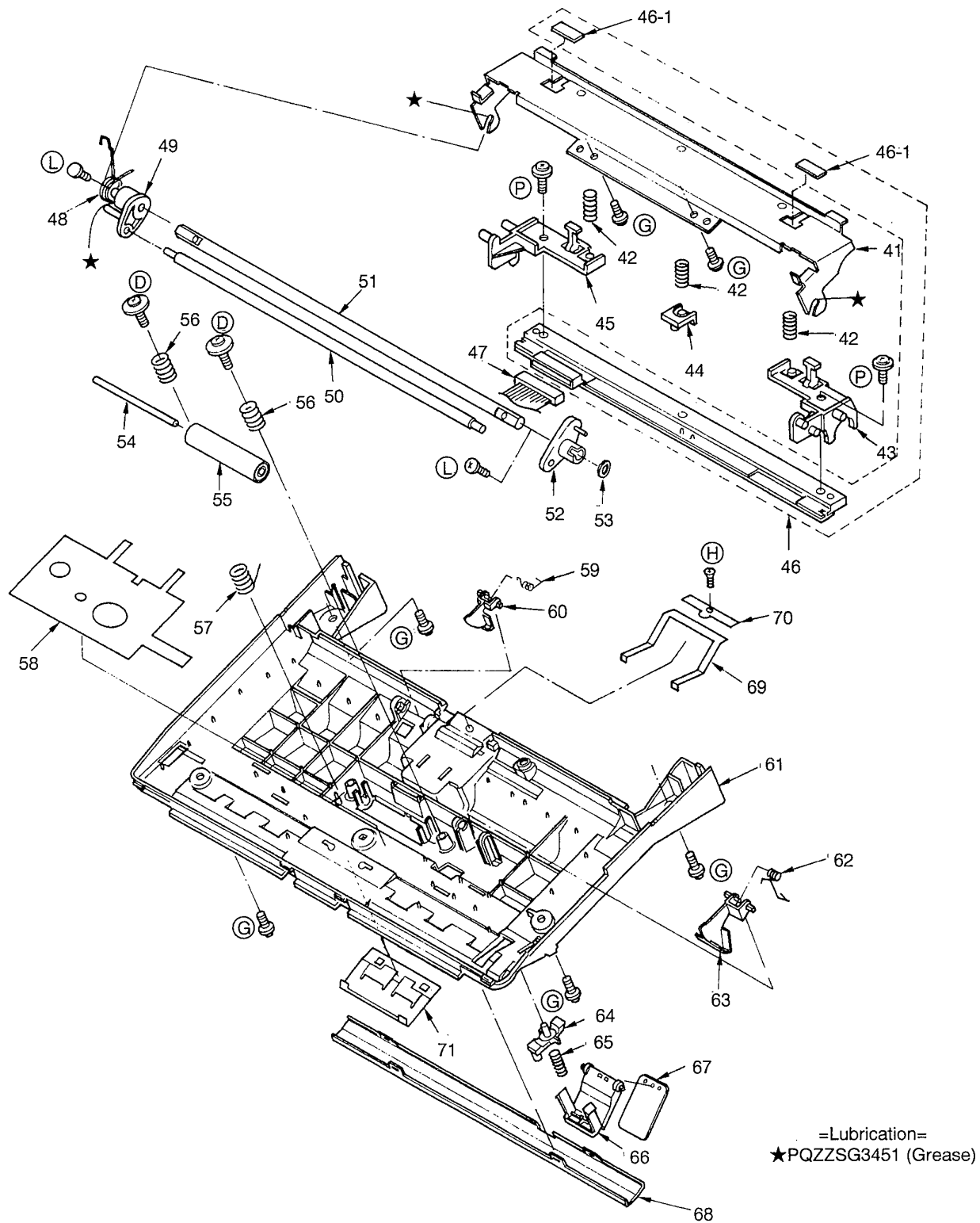


## CABINET, MECHANICAL AND ELECTRICAL PARTS LOCATION

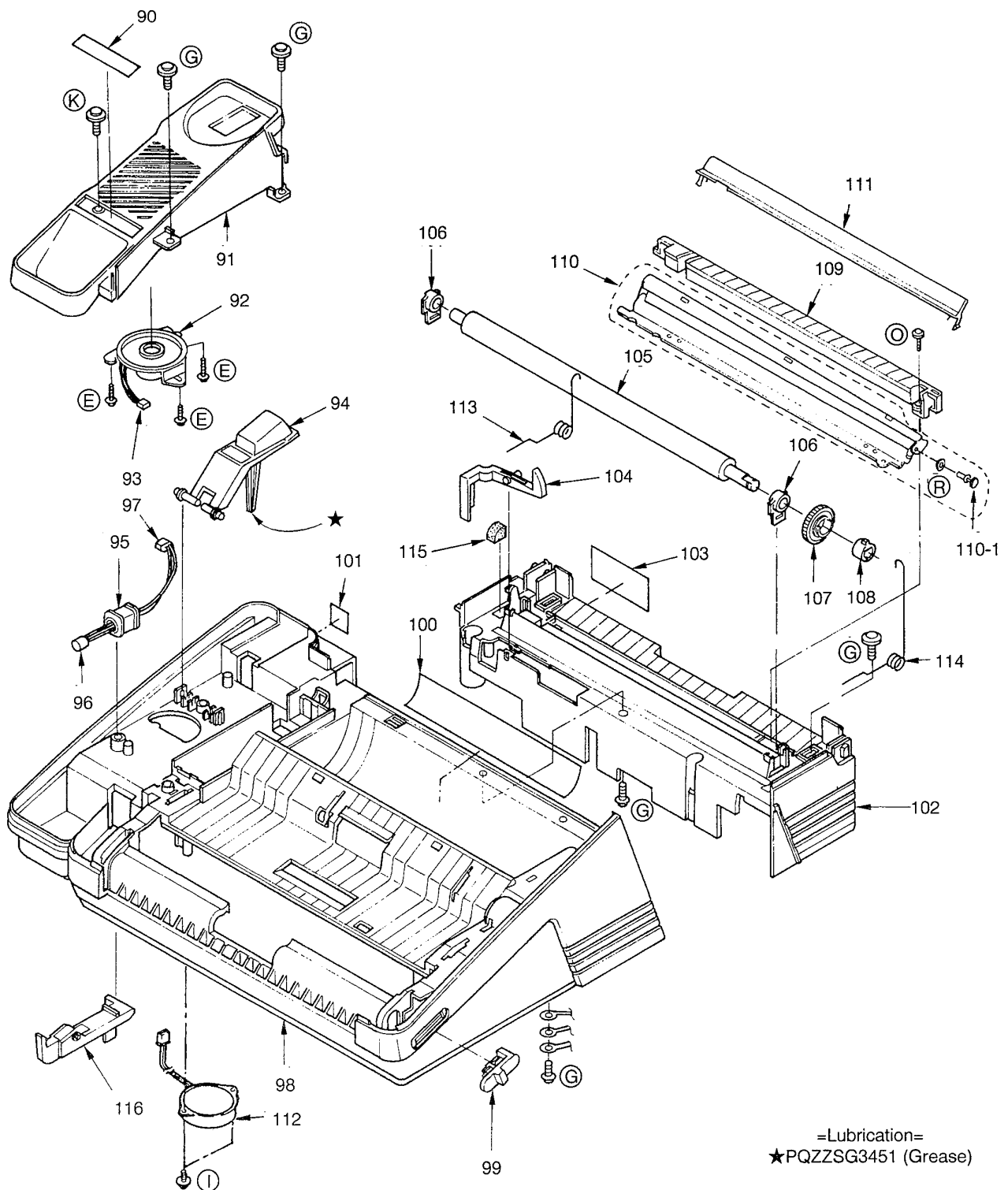
### 1. OPERATION PANEL SECTION



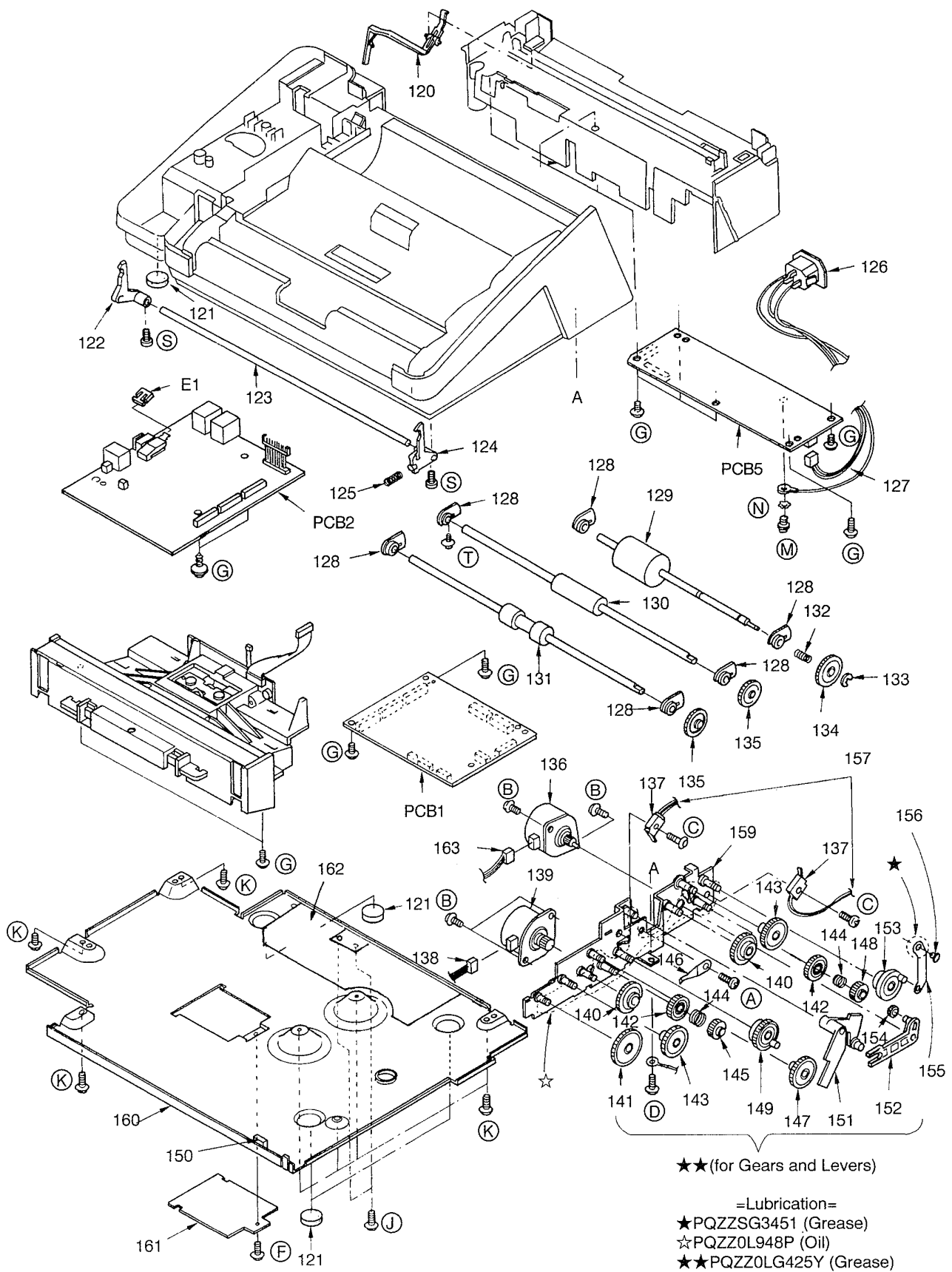
## 2. THERMAL HEAD SECTION



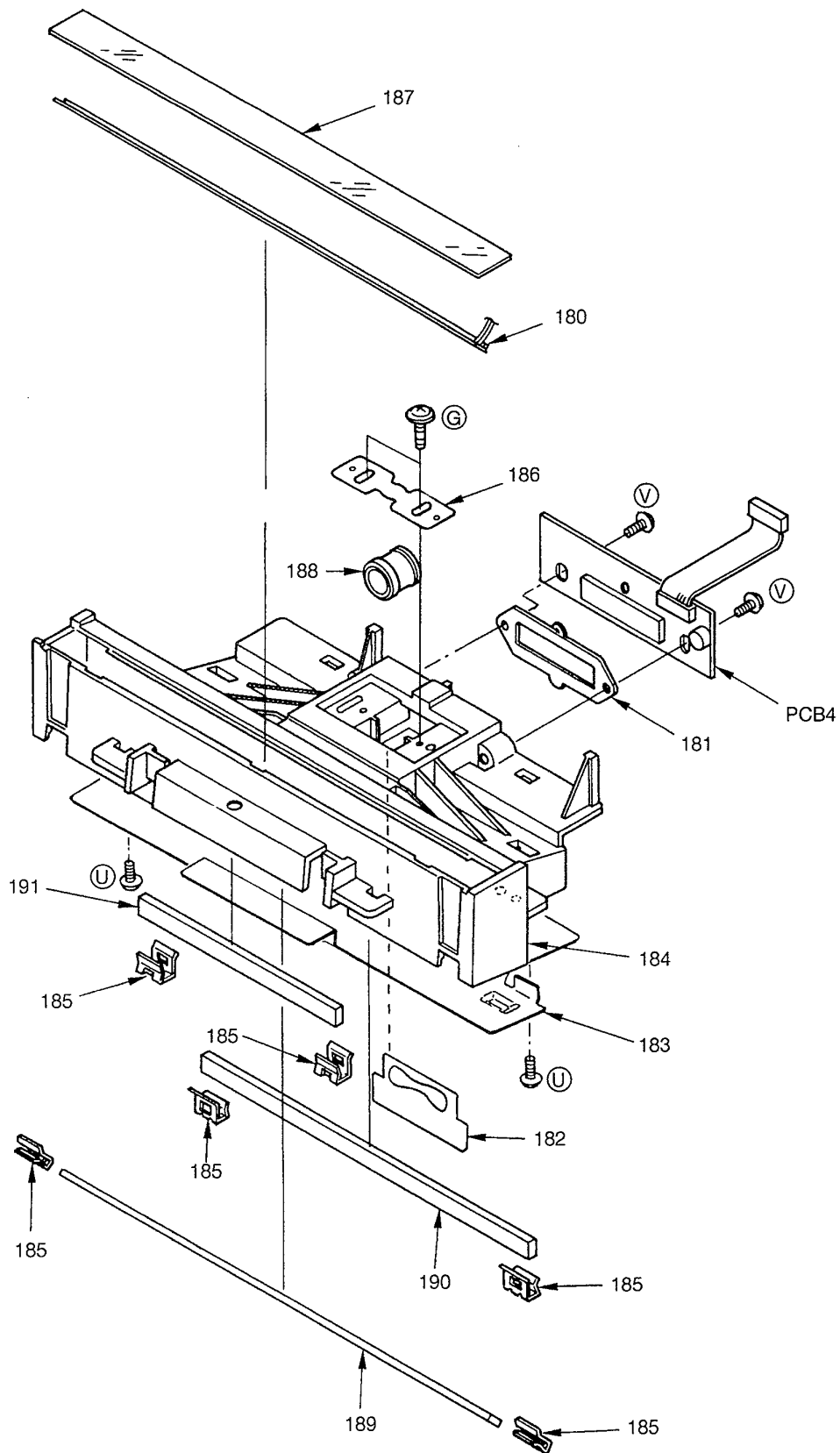
### 3. UPPER BODY SECTION























#### 4. LOWER BODY SECTION



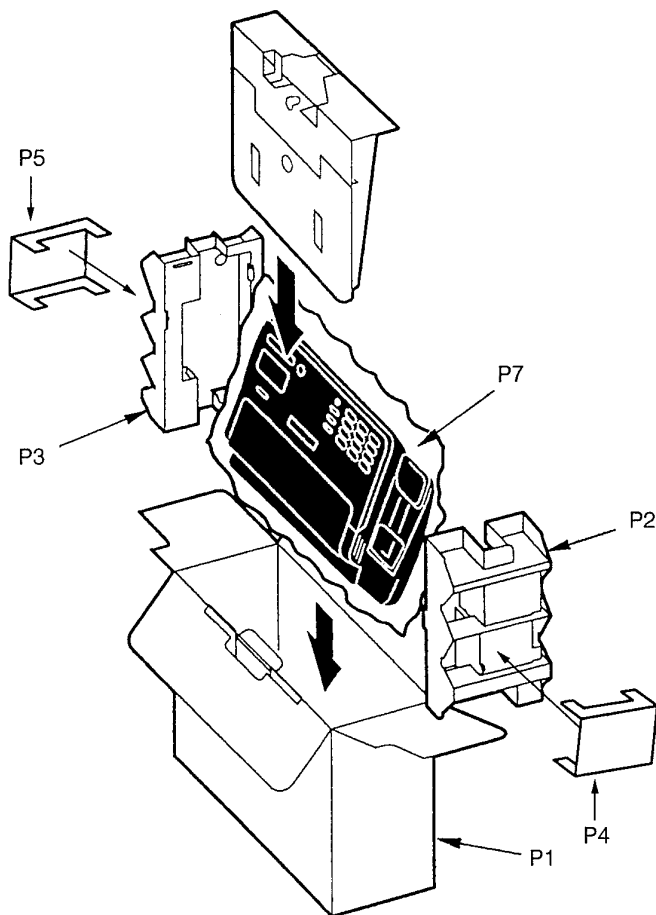
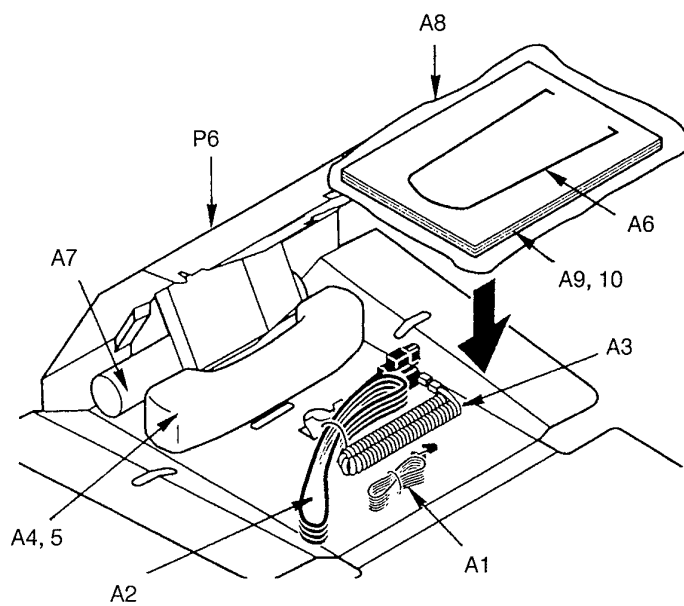
5. CCD UNIT SECTION



## 6. ACTUAL SIZE SCREWS AND WASHER

| Ref. No. | Part No.  | Figure  | Ref. No. | Part No.  | Figure  |
|----------|-----------|---|----------|-----------|---|
| Ⓐ        | XTT3+5F   |    | Ⓜ        | XSB4+6    |    |
| Ⓑ        | XYC3+CF6  |    | Ⓝ        | XWC4B     |    |
| Ⓒ        | XYN2+C8   |    | ⓪        | XYN3+CF14 |    |
| Ⓓ        | XTW3+W10P |    | Ⓟ        | XYC3+FF8C |    |
| Ⓔ        | XTW3+S8M  |    | Ⓠ        | Not Used  |   |
| Ⓕ        | XTW3+U6L  |    | Ⓡ        | XWG2C6VW  | ⓪   |
| Ⓖ        | XTW3+S10P |    | Ⓢ        | XTW26+5LF |    |
| Ⓗ        | XTS26+8G  |    | Ⓣ        | PJHE5065Z |    |
| Ⓘ        | XTW26+8F  |  | Ⓤ        | XTB3+8G   |  |
| Ⓙ        | XSN3+W6FZ |  | Ⓥ        | XYN3+F16  |  |
| Ⓚ        | XTW3+S12P |  |          |           |   |
| Ⓛ        | XST26+5   |  |          |           |   |

## ACCESSORIES AND PACKING MATERIALS



KX-F2200E-G/KX-F2200E-W